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ABSTRACT

Reported were results of 17,000 Stanford Academic Achievement Tests administered to students enrolled in primary and secondary educational programs for the hearing impaired. Test results were presented according to student age and three classifications of hearing loss levels. Bar graphs and tables showed subtest patterning trends for the learning processes of hearing impaired students. Examined was a series of modifications in testing procedures that were implemented to standardize test administration practices with hearing impaired students. Data showed an overall trend for hearing impaired students to achieve better in reading than in other academic areas during the first 1 to 3 years of education. Thereafter, hearing impaired students achieved better in mathematics and in low verbal subject areas. Data indicated that the severity of hearing loss affected reading comprehension most directly. Students with the greatest hearing loss performed best in low verbal and nonverbal academic areas such as spelling and arithmetic computation. (Author)

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NUMBER 9

DATA FROM THE
ANNUAL SURVEY OF HEARING IMPAIRED CHILDREN AND YOUTH

ACADEMIC ACHIEVEMENT TEST RESULTS OF A NATIONAL TESTING PROGRAM FOR HEARING IMPAIRED STUDENTS

UNITED STATES: SPRING 1971

This publication presents the results of approximately 17,000 Stanford Achievement Tests administered to students attending special educational programs for hearing impaired individuals. The results are presented to give an overall understanding of the relationship of age and hearing threshold level to the academic achievement test performance of this student population.

OFFICE OF DEMOGRAPHIC STUDIES
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Sal DiFrancesca
Washington, D.C.
July, 1972

ABSTRACT

This publication presents the results of 17,000 Stanford Academic Achievement Tests administered to students enrolled in primary and secondary educational programs for the hearing impaired in Spring 1971. Test results are presented according to student age and three classifications of hearing loss levels. Bar graphs and tables show sub-test patterning trends that shed light on the learning processes of hearing impaired students.

The publication describes a series of modifications in testing procedures that were implemented to standardize test administration practices with hearing impaired students throughout the country. Some potential limitations and qualifications of the test information itself are also discussed. These limitations stem from the fact that the Stanford Achievement Tests were developed for normally hearing students in regular school programs.

There is an overall trend for hearing impaired students to achieve better in reading than in other academic areas during the first 1 to 3 years of education. Thereafter, students achieve better in mathematics and in low-verbal subject areas. Also reviewed is the relationship of the degree of hearing loss and achievement. The data show that the severity of hearing loss affects reading comprehension ability most directly. A reverse of this trend occurs for low-verbal and non-verbal academic areas such as spelling and arithmetic computation, where students with the greatest hearing loss perform better.

These data can be used by educators to compare the performance of groups of students or schools as a whole to a large national group of hearing impaired students. The achievement testing program conducted by the Annual Survey of Hearing Impaired Children and Youth is part of an overall project to improve methods of measuring the achievement of hearing impaired students.

Academic Achievement Test Results of a National Testing Program for Hearing Impaired Students, United States: Spring 1971

Sal DiFrancesca, Ph.D.

INTRODUCTION

Teachers, administrators, and educational planners have long been concerned with the measurement of academic achievement of hearing impaired students. These individuals have been eager for national data on the achievement levels of hearing impaired students as well as for a deliberate research effort to determine the appropriateness and suitability of standard achievement tests for their student population. In response to this need, the Annual Survey of Hearing Impaired Children and Youth has devoted part of its resources to collecting and analyzing testing information on students attending special educational programs due to their hearing impairment. The longer range purposes of this activity are to determine the suitability of existing achievement tests for these students and to develop procedures and materials designed to enhance the validity and reliability of achievement testing results.

In the Spring of 1969 and 1971, the Annual Survey conducted achievement testing programs which encompassed large numbers of schools and classes for the hearing impaired throughout the country. This report will present the results obtained in the testing program of Spring 1971, during which time approximately 19,000 tests were administered to hearing impaired students. The Stanford Achievement Test Series were used as the test instruments.

The Annual Survey is conducted by the Office of Demographic Studies, Gallaudet College, Washington, D. C. The Division of Research, Bureau of Education for the Handicapped, Department of Health, Education and Welfare provides the major share of funding for the Survey. Gallaudet College provides the balance of funding. Further details concerning the activities and policies of the Survey may be found in Appendix I.

PURPOSE AND CONTENTS OF THIS REPORT

The testing data collected by the Annual Survey will be presented to give an overall view of how students in special educational programs for the hearing impaired performed on a test of academic achievement. This report shall focus on describing the relationship of students' age to academic achievement and the relationship of achievement to the students' degree of hearing loss. Thus, the national results from this testing program are shown in a series of tables and graphs depicting the interdependence of chronological age, hearing loss level, and academic achievement.

This information will allow those in educational programs that participated in the testing program to compare the performance of their students to the performance of other hearing impaired students of the

same age taking the same test, throughout the United States. However, in making such comparisons or in otherwise using these data, it must be kept in mind that these results are not to be considered national achievement test norms for hearing impaired students. At this point many problems in test validation for this student population have not been resolved. These problems are discussed in a later section of this report.

The procedures used to collect the achievement data are described along with an evaluation of the overall quality and accuracy of the test results obtained. Suggestions on how to make use of this testing information are also given.

BACKGROUND OF THE ACHIEVEMENT TESTING PROGRAM

The importance of assessing the academic achievement of hearing impaired students has been stressed by the National Advisory Committee of the Annual Survey since this program was established in 1968. This Committee advised the Annual Survey to collect national level statistics on the achievement of hearing impaired students and to begin evaluating the appropriateness of standard achievement tests for use with this student population. The Stanford Achievement Test Series were chosen as the initial testing instruments after a survey taken in 1968 indicated these to be most commonly used among educators of hearing impaired students.

The Annual Survey conducted its first national testing program in the Spring of 1969. At that time approximately 12,000 tests were administered. The analyses of that data indicated a need for the establishment of uniform testing procedures among schools and classes throughout the nation and indicated features of the Stanford Tests that were not appropriate for hearing impaired students. To overcome these problems, supplementary testing procedures and materials were developed by the Annual Survey to encourage standardized testing practices on a national level. An experimental test edition was also developed in an attempt to overcome limitations of dictating test questions to hearing impaired students.

With these testing modifications, a second national testing program was sponsored in Spring 1971 in which test returns were gathered on slightly over 19,000 students. A more thorough description of the new procedures implemented in the 1971 testing program can be found in Appendix II. Also, a test-retest reliability study with the Stanford was conducted on a national sample of hearing impaired students in the Spring of 1971. Analyses of all the testing data collected thus far will provide the basis for evaluating the effectiveness of the experimental procedures used in this testing program and for establishing further testing modifications, if so required.

SOURCES OF THE TEST RESULTS IN THIS REPORT

All of the special educational programs for hearing impaired students in the United States that were known to the Annual Survey were invited to participate in the Achievement Testing Program. This encompassed 776 programs representing approximately 48,000 students. Of this number, 292 programs participated and submitted over 19,000 individual achievement tests. The names of those schools and classes that joined this testing program are listed in Appendix IV.

The reason most frequently given by an educational program for not participating was that they enrolled pre-school age students only or students too young to be tested. Some other major reasons were: insufficient staff to administer the tests; a compliance with school district testing programs that were not using the Stanford Series; itinerant programs enrolling many small groups of students in a wide geographical area; and reservations about the Stanford tests for hearing impaired students.

Table A gives the total number of students for whom results were obtained according to the type of educational program in which they were enrolled. Note that approximately 69 percent of these students were enrolled in schools and 31 percent in class programs. The "school" category encompasses both residential and day school programs. The category "classes" includes those programs which are not in a separate building facility for the education of hearing

TABLE A: NUMBER OF STUDENTS PARTICIPATING IN THE ACHIEVEMENT TESTING PROGRAM ACCORDING TO THE TYPE OF PROGRAM IN WHICH THEY WERE ENROLLED: SPRING 1971.

Type of Educational Program	Number of Sources	Number of Students	Percent of Students
All Programs	288	19,037	100.0
Schools	86	13,225	69.5
Classes	202	5,812	30.5

impaired students but rather, provide educational services for these students as part of an integrated school setting. Classes may provide full-time, part-time or itinerant services. Table A does not include 82 students from four institutions for whom results were received too late to be included in this report. Their booklets arrived beyond the cut-off date for machine scoring and thus computer cards of students' results were not obtained.

DATA COLLECTION METHODS

All of the programs that participated were asked to follow test administration procedures specified by the Annual Survey. The purpose of these procedures was to standardize testing practices throughout the country. Implementation of standardized testing procedures was the major task of the 1971 testing program. A full description of the testing practices and materials along with reasons for their development are presented in Appendix II. A brief coverage of them is given below, however. Knowledge of the standardization procedure is basic to understanding this testing project.

1) Each student received a short pre-test or screening test which was used to determine the full battery level of the Stanford most valid for him.

2) Each student received a practice test before taking the Stanford. The practice tests were developed to teach students the mechanics of test taking and the question-answer marking format of the real test.

3) An experimental test edition designed for hearing impaired students was used at the Primary I and II battery levels (Form W-HI).

Of all these, the screening test procedure had the most impact on the test results. This consisted of a short reading comprehension test. The student's score on the screening test provided a guide as to which of the five full battery levels of the Stanford he was to receive. Previously, such decisions had been determined by the student's age, his class placement, teacher judgment, and other factors which varied among the educational programs.

Analyses of the returns from the 1969 program indicated that a large percentage of the students received test batteries too difficult for them. Thus, a high percentage of their scores fell within the guessing or chance range and were not valid or useful to teachers. In most cases these grade equivalent scores were higher than they should have been because of the guess-score effect. Though scores obtained in the 1971 testing program generally are lower, they are more valid and more accurately represent the student's achievement level. This issue is discussed in more detail in a following section, Comparison of Results From the 1969 and 1971 Testing Programs.

Table B shows the distribution of achievement tests administered according to the test battery level. Approximately 70 percent of the students received tests at the Primary I or II level.

The breakdown of the test battery levels administered according to the age of students is given in Table C. Notice the wide range of ages for each battery, particularly the Primary I and II levels. This appears mainly to have resulted from the screening test procedure which caused batteries to be chosen on the basis of the students' general reading ability. Preliminary analyses of the 1971 returns indicate that at the extremes of the age distributions, age should be included as a factor in choosing a student's test level. Sixteen, seventeen, and eighteen year olders are not receiving the academic content reflected in test batteries designed for second and third grade students.

The Annual Survey supplied all of the testing materials and scoring services free-of-charge to the participating programs. These materials were shipped from the Annual Survey, administered by the educational programs themselves and the tests returned to the Annual Survey for preparation for scoring. At that point, the booklets were given identifying code numbers and forwarded to the Harcourt Brace Jovanovich machine scoring center. The participating programs received grade scores, raw scores, percentile ranks, item analysis reports, and individual record labels for each student.

TABLE B: NUMBER OF ACHIEVEMENT TESTS ADMINISTERED ACCORDING TO TEST BATTERY LEVEL: SPRING 1971.

Test Battery Level	Number	Percent
All Levels	19,037	100.0
Primary I	6,786	35.6
Primary II	6,655	35.0
Intermediate I	3,215	16.9
Intermediate II	1,566	8.2
Advanced	815	4.3

The achievement test tabulations in this report were obtained by matching a student's achievement scores with his record of demographic information on file with the Annual Survey. Table C shows that it was not possible to determine the ages of approximately 2,000 students. This was a result of two factors: 1) The educational program in which the student was enrolled had not participated in the demographic study aspect of the Annual Survey and thus no record file was maintained on the student, or

TABLE C: NUMBER OF STANFORD ACHIEVEMENT TESTS INCLUDED IN THIS REPORT BY AGE AND TEST BATTERY LEVEL: SPRING 1971.

Age	Battery Level					
	All Levels	Primary I	Primary II	Intermediate I	Intermediate II	Advanced
All Ages Tested	19,037	6,786	6,655	3,215	1,566	815
Unknown Age	2,129	800	722	394	125	88
Total Students Included in This Report	16,908	5,986	5,933	2,821	1,441	727
Under 6	31	27	2	1*	1*	–
6	341	335	3	2	1*	–
7	454	425	25	2	1*	1*
8	697	606	85	6	–	–
9	971	718	238	11	3	1*
10	1,297	779	466	42	9	1*
11	1,600	765	737	72	25	1*
12	2,316	913	1,092	232	66	13
13	1,547	401	758	288	84	16
14	1,573	352	674	392	117	38
15	1,455	230	538	409	215	63
16	1,315	161	451	355	210	138
17	1,244	119	361	375	239	150
18	1,154	108	300	325	248	173
19	639	35	142	208	152	102
20	222	10	47	86	54	25
21 & Over	52	2	14	15	16	5

*These results are highly improbable and may reflect an error in scoring or the age given for the student who took the test.

2) It was not possible to match the student's test with his demographic record due to use of different student identification system on the two items, e.g. a name on the demographic record and a code number on the test. The people working on this project were instructed to leave a case unmatched where reasonable doubt existed as to whether a correct match could be made. This decision was based on the notion that it was preferable to reduce the number of matched results than to mismatch a student's test results with a demographic record.

All tabulations and discussion of data in the remainder of this report will refer to the 16,908 students for whom achievement test results were received and for whom a match with the basic data could be made. Appendix III presents the basic demographic characteristics of the 16,908 students whose test scores are analyzed in this report. Also shown in this Appendix are the distribution of these characteristics for the 41,109 hearing impaired students that were reported to the Annual Survey of Hearing Impaired Children and Youth for the 1970-71 school year.

DESCRIPTION OF THE STANFORD ACHIEVEMENT TESTS

The Stanford tests are described by their authors as comprehensive achievement tests designed to measure student progress in subject areas, skills, and understandings generally accepted as desirable outcomes of elementary and secondary education. The tests are intended to provide dependable measures of these outcomes comparable from pupil to pupil and grade to grade. They are particularly useful in the evaluation of student progress, guidance, and improvement of instruction.

Five test battery levels of the Stanford Series were used in the national testing program. These batteries range from the Primary I to the Advanced level. Each battery covers academic materials appropriate for students within a specific grade range. The sub-tests within the battery cover the academic content areas for the respective grades. Names of the sub-tests included in each battery are presented in Table D. The test form used in this study was Form W, 1964 edition.

The Stanford Achievement Test is an example

TABLE D: SUB-TESTS CONTAINED IN SUCCESSIVE BATTERY LEVELS OF THE STANFORD ACHIEVEMENT TEST SERIES, FORM W.

Primary I	Primary II	Intermediate I	Intermediate II	Advanced
Word Reading	Word Meaning	Word Meaning	Word Meaning	
Parag. Meaning	Parag. Meaning	Parag. Meaning	Parag. Meaning	Parag. Meaning
Vocabulary	Science & Social Studies Concepts			
Spelling	Spelling	Spelling	Spelling	Spelling
Word Study Skills	Word Study Skills	Word Study Skills		
	Language	Language	Language	Language
	Arithmetic Computation	Arithmetic Computation	Arithmetic Computation	Arithmetic Computation
Arithmetic	Arithmetic Concepts	Arithmetic Concepts	Arithmetic Concepts	Arithmetic Concepts
		Arithmetic Applications	Arithmetic Applications	Arithmetic Applications
		Social Studies	Social Studies	Social Studies
		Science	Science	Science

of the type of achievement test commonly used in educational programs for normal hearing students. The academic material covered by the test questions reflects the curriculum of regular school programs. Students enrolled in special educational programs for the hearing impaired were not included in the standardization procedures and norms for this test.

QUALIFICATIONS AND LIMITATIONS OF THE TESTING RESULTS

The foremost qualification of the testing results arises from the fact that the Stanford tests were developed and standardized for hearing students attending regular educational programs. When a test is used with a student population other than that for which it was standardized, its validity and reliability may be lowered. To be fully satisfactory for our purposes, the academic material covered by the test must appear in the school curriculum for hearing impaired students to the same extent it does in regular educational programs. Also, the mode of presenting the test questions and the reading and language level of the test materials themselves must not bias the results of hearing impaired students.

The Annual Survey is undertaking a series of research studies to determine the suitability of the Stanford tests for hearing impaired students. Although this test evaluation program is still incomplete, some observations relating to the data reported herein are included below.

Hearing impaired students do relatively poorly on dictated test items. The experimental test form (Form W-HI) used in the 1971 testing program did not appear to satisfactorily overcome the limits of dictated sub-tests for these students. It may not be possible to validly standardize the administration of dictated test questions to these students and any results from such tests must be used with caution.

The Word Study Skill sub-test of the Primary I, II and Intermediate I battery reflects a student's ability for rhyming sounds and matching phonetic patterns. It lacks content validity for hearing impaired students. Performance on this sub-test is largely related to hearing loss levels.

Identical grade equivalent scores may have different implications for deaf and hearing students on some sub-tests. For example, a hearing student obtaining a grade score of 4.0 in vocabulary most likely has a different overall vocabulary knowledge than a hearing impaired student obtaining the same vocabulary score. The reading tests (Paragraph Meaning) of the Stanford are structured to measure ability to comprehend and derive meaning from a paragraph. As comprehension is crucial here, test performance should not be a function of vocabulary level. The accurate appraisal of reading comprehension ability will be confounded and invalid to the extent students lack the vocabulary in which the paragraphs are written.

Due largely to the screening test procedures, many older students received primary level test batteries. For example, 155 students age 18 or above received the Primary I battery which is designed for first and second grade students. The academic content of this battery appears inappropriate for older students. It does not reflect the types of materials they are receiving in class. Such students are unlikely to be motivated by the test materials and their results are likely invalid. This suggests that the student's age needs to be considered along with his score on the screening test in selecting the best test battery.

However, on the whole students seemed to have received test levels not too difficult or easy for them. For all sub-tests in all batteries, the national average test scores are considerably above what would have occurred had the students merely guessed the answers. This point is discussed in detail in the Annual Survey publication Series D, No. 8, *Item Analysis of an Achievement Testing Program for Hearing Impaired Students, United States: Spring 1971.*

The practice test materials and practice sessions were very useful in teaching students the mechanics of test taking, and it is believed that this led to an overall improvement in quality of test results. While the standardized procedures developed for the national testing program of Spring 1971 increased the quality and value of test results over those obtained in the Spring of 1969, the results in this publication should not be considered as national testing norms for hearing impaired students. More research studies need to be completed into the suitability of the test for these purposes. A more accurate use of these data must await a study of the effect on achievement of the full range of student variables such as age at onset of hearing loss, presence of other handicapping conditions, the age students began their education, etc. Relationships shown in this publication such as that between achievement and hearing loss level may be also influenced by the effect of these other variables. In addition, although almost 17,000 students are included, this group may not be representative of the total population of students obtaining special educational services due to hearing impairment.

In conclusion, it is strongly asserted that even though the results are presented in terms of "grade equivalents" they should not be treated as absolute values and they should not be used to compare the general academic achievement of hearing impaired

students to the achievement levels of hearing students. More appropriately the results should be considered as relative values that show relationships between sub-groups of the population that participated in the testing program.

COMPARISON OF RESULTS FROM THE 1969 AND 1971 ACHIEVEMENT TESTING PROGRAMS

The results of the 1969 Achievement Testing Program were made available in earlier publications.[1] Individuals wishing to compare the results of the two testing programs, however, must do so with some qualifications in mind. Although the Stanford Achievement Tests (Form W) were used in both programs, basic differences occurred in the manner in which the tests were administered. Differences in results between the two testing programs are more likely a function of different testing procedures than a reflection of change in actual student achievement levels.

In a great number of cases, individual students obtained lower scores in 1971. Though these results may have been disappointing to teachers, these scores are generally more valid and useful to them. A lowering of scores resulted from implementing the screening testing procedures used in selecting the most valid battery level for a student.

Many students received test battery levels too high and difficult for them in 1969. By knowing a few answers and guessing the others, they obtained high basal scores. The higher the battery level administered, the higher would be the basal score. As an example, by merely guessing all answers to the Paragraph Meaning Test of the Advanced battery, one would likely receive a chance rate grade equivalent score of 4.8. The screening procedures would indicate that these students should have received a lower level test battery, one within the range of their overall reading ability. As a result, students scored lower but within the valid range of the test they received.

The practice tests were also new in 1971 as were the special test edition at the Primary I and II levels (Form W-HI). Together, the standardized procedures of 1971 created different testing conditions which affected testing outcomes. Further, the sample of students represented in the two programs differ. Technically, results of this year are not comparable to those of 1969 and any differences observed on a national basis should not be interpreted as reflecting changes in student achievement levels over the two year span.

[1] *Academic Achievement Test Performance of Hearing Impaired Students, United States, Spring 1969.* Gallaudet College, Office of Demographic Studies, Series D. Number 1, and *Item Analysis of Academic Achievement Tests Hearing Impaired Students, United States, Spring, 1969.* Gallaudet College, Office of Demographic Studies, Series D. Number 2.

USES OF THE ACHIEVEMENT TESTING INFORMATION

A goal of this report is to describe the academic achievement levels of hearing impaired students as measured by the Stanford Achievement Tests. This information provides a view of how a large national group of students are achieving, along with a patterning of their learning profiles. Thus, these data can be used for educational planning and research purposes, keeping in mind, of course, the limitations of the results previously noted.

The set of tables in this text showing the subtest patterning of scores for each battery are most useful for indicating strong and weak areas in the academic achievement of students. In reviewing the tables from the Primary I through the Advanced batteries, very definite learning patterns emerge. The reader may study patterns of uneven distributions in the performances of students and attempt to relate them to their probable cause. This patterning is possibly explained by the effect of hearing loss, language deprivation, teaching methods, and curriculum content of the educational programs for hearing impaired students.

Educational programs that participated in the National Testing Program were provided with summary scores for each test battery their students received. These programs are able to take their average scores for each sub-test and make charts similar to the ones in this publication based on the performance of their own students. In this way, it is possible for an individual school to compare the performance of its students and sub-test patterning on a test battery with the national group of hearing impaired students taking the same battery. Such a relationship could be shown clearly if a bar graph were made showing the average scores for the school and the national sample on each of the sub-tests in the battery. Differences in the patterning between the local program and the national population may shed light on the curriculum emphasis or effectiveness of teaching for the local school. Local programs with higher scores than national results will, of course, be satisfied and examine the reasons for their success. Those programs performing less well must determine if the curriculum measured by the test appears in the school program. If the school strives to teach the curriculum, they must search for other causes to explain why their students perform lower than the national group.

The sub-test patterning for the school may also indicate the strong and weak learning areas of students and suggest a need for remedial teaching approaches. In so doing, however, keep in mind that the Stanford Achievement Test does not purport to reflect what *should* be taught in the curriculum. Rather, the test reflects what *is* most commonly taught in regular public school programs.

The tables in this text reporting achievement scores by hearing loss levels are designed to shed light on the ramifications of hearing loss on learning. You will notice that clear patterns emerge upon relating achievement to hearing loss level.

The tables showing achievement scores by student age also may be useful in educational planning. These tables were designed to present achievement as it relates to the students' chronological age and to facilitate comparing local school programs to the national group of students. For these purposes, it is most valid to compare a particular student or student group to other students of the same age who took the same test battery level. For example, ten year olders taking the Primary II battery should be compared to the national sample of students ten years of age taking the same battery. Using the tables in this report, educators can compare the achievement of their own students to national groups of students who are of the same age and taking the same battery.

It is important to emphasize that any comparison between the scores of students in a local area with the national results for a given battery should take into account the age distribution of the students taking the battery. Thus, for instance, the fact that local students taking a given battery tended to score lower than students in the nation taking the same battery would be differently interpreted if the average age of the local students taking the battery was three or four years younger than the average age of the students in the nation who took the same battery.

HIGHLIGHTS OF THE TEST RESULTS

The amount of information on the achievement performance of hearing impaired students presented in this publication is quite extensive and for the most part the reader is left to draw conclusions from it and interrelate those variables that are of particular interest to him. However, there are some highlights of these data that become immediately apparent and are of an interesting nature as to be presented here.

The first observation relates to the crucial issue of the validity of the test results. As noted earlier, analyses of these results have shown that the scores are within the valid range for each of the batteries on which they were obtained. The sub-test scores are above what students would have received from merely guessing the answers, and below the level of the test being too easy for them. For the most part, students received battery levels of the proper academic difficulty for them. This fact enhances the meaningfulness and usefulness of the national test data. You will notice also, that there are very distinct patterns due to the different academic areas represented on the tests and due also to differences in student hearing loss levels. The appearance of these patterns is one example that the tests are sensitive to measuring differences in academic achievement among students. Thus, the tests are showing the desirable characteristic of having discrimination power when used with hearing impaired students.

Test results show that in the early years of education, students do relatively better in reading areas than in mathematics. What appears to be happening is that language and reading basics are heavily stressed in the very early years. Other academic areas are de-emphasized to concentrate on reading. Students do not seem to be getting the same emphasis in other curriculum categories until their reading scores are in the grade 2 range. Reading and reading achievement appear closely linked with the stress on communication training during the primary school years.

All students taking the Primary I battery seem to achieve at the same academic level, regardless of their hearing loss. Differences in student performance due to hearing loss levels do not appear until the Primary II battery, which is designed for the middle of grade 2 to the end of grade 3. The reasons for this disparity with the Primary I and why scores do not differentiate on the basis of hearing loss is intriguing.

Level of hearing loss affects performance in reading or high language areas differently from the way it affects mathematical and low language areas, throughout most of the test results. For example, on the Primary II through the Advanced batteries, students able to hear better get higher scores on Paragraph Meaning and other high language academic areas, i.e., Science, than students with more severe losses. Is it that the grammatical and structural patterns of written language are relatively very hard to grasp unless one has some conception of the flow of verbal speech? Through all the drill exercises and years of school, students with high hearing loss levels never do perform as well in reading comprehension as do students with some hearing in the speech range even though they are in the same classes.

However, from the Primary II battery level

through the Intermediate II (grade equivalents 2.5 to 6.9), these students do relatively better in low language academic areas, e.g. Arithmetic Computation, than students with less of a hearing loss. Students with hearing loss levels of 99 dB and above score approximately one full grade year ahead of their fellow students of the same age and taking the same battery level who have hearing loss levels of 0-59dB. This trend is also pronounced in spelling, punctuation and capitalization tasks and so on. Common to such tasks is the fact they do not require a very high reading comprehension level. Thus students are able to study these academic areas on their own, from their own textbooks and are not confronted with difficult reading material to do so.

Reading comprehension turns out to be the most difficult academic area of all those covered by the Stanford tests. It appears to be the area most severely affected by deafness. Related to this, is that the Stanford test shows students' vocabulary to be weak. Vocabulary and knowledge of word meanings are of course the building blocks of reading ability. It is quite possible that students are not scoring well on reading comprehension materials because they have a more limited vocabulary.

In general, the test results suggest that students tend to perform better in academic areas that call for basic and mechanical type knowledge, for example, capitalization skill, computation, spelling and so on. Academic areas found relatively difficult for them are those dealing with inferential thinking, and generalizing knowledge to new situations. This tendency is reflected in relatively lower scores on sub-tests as Arithmetic Applications, Arithmetic Concepts and Paragraph Meaning.

PRESENTATION OF THE ACHIEVEMENT TEST RESULTS BY BATTERY LEVEL

In the following sections the testing results are presented according to test battery levels proceeding from the Primary I to the Advanced battery. In using this information, be sure to keep in mind the importance of the test battery level on which the score was obtained. For example, a grade equivalent of 4.0 obtained on the Primary I battery is not to be equated with a 4.0 from the Advanced battery. The content and conceptual level of these two tests differ and the scores do not have the same meaning.

Bar Graph of Sub-Test Patterning

For each battery, a bar graph is presented showing the average grade equivalents based on all students taking the battery. Its purpose is to show the patterning of sub-test results. If these test results were based on an equally large number of normally hearing students, there would be very little variation among the average scores for each sub-test. That is the way in which the test norms were standardized for regular public school students. Very definite and pronounced patterning trends were obtained from hearing impaired students, showing unevenness in their sub-test performance. An analysis of this trend by the academic content of the sub-tests will illuminate strong and weak learning areas of hearing impaired students.

Bar Graph of Test Performance by Hearing Loss Levels

Next follows a bar graph showing test performance as a function of the degree of hearing loss. The categories of hearing loss shown are: "59dB and below", "60 to 98dB", and "99dB and above". The main criterion used in choosing these categories was their breadth, which encompassed large numbers of students. As an example, a category for students with hearing levels of 35dB and below would be interesting from educational and research viewpoints but, on analyzing these data by test battery level and age, the number of students in this category would be so small as to present unstable national level scores. The broad categories presented, however, do show trends in academic achievement due to degree of hearing loss. These patterns will interest individuals concerned with the effect of severity of deafness on learning.

Data related to students' degree of hearing loss are based on a smaller number of cases. This is because a better ear average could not be computed on approximately seventeen percent of the students taking the tests.

Average Test Scores for Each Age

This table is included to show the relationship of age and achievement on a particular test battery. It gives the average sub-test score obtained for students of each age taking the battery. These scores are helpful in allowing schools and teachers to compare performance of their students with other hearing impaired students in the country taking the same battery.

Average Scores for Students Classified by Age and Hearing Loss Level

The last table for each battery shows the average sub-test scores classified by each age and three major hearing loss levels. Its purpose is to give a comprehensive picture of the relationship of achievement scores and the variables of age and severity of hearing loss.

PRIMARY I BATTERY (FORM W-HI)
ACHIEVEMENT TEST RESULTS

The Primary I battery was designed for regular public school students from the middle of grade 1 to the middle of grade 2. It is designed to measure fundamentals of reading and arithmetic skills. This battery was taken by approximately 35 percent of the hearing impaired students in the national testing program.

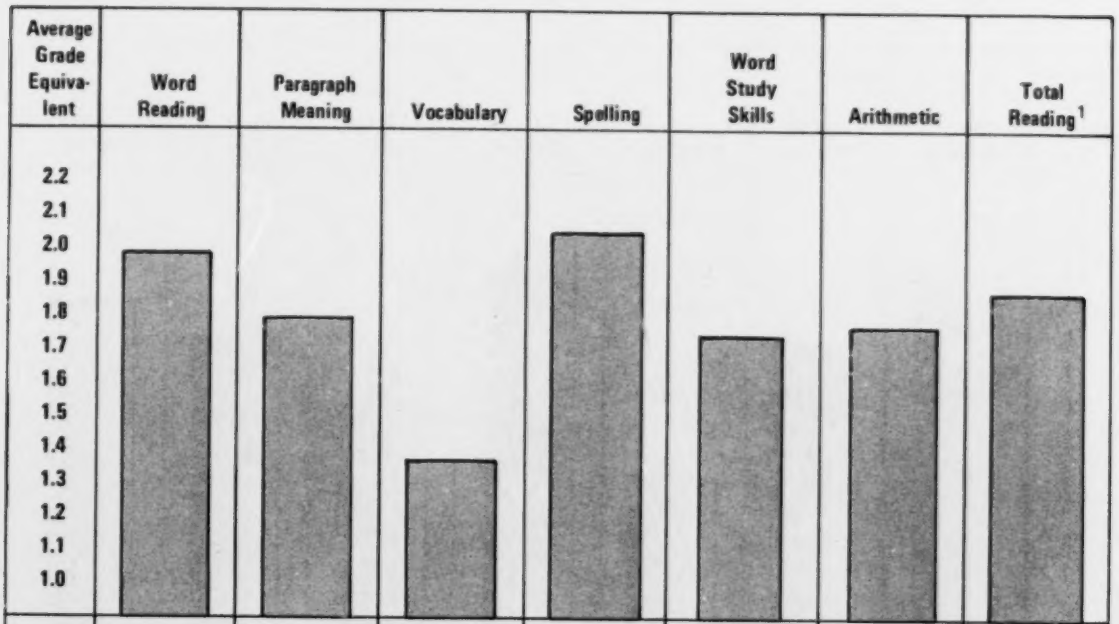
Table Pr. I-A shows that at the Primary I level, overall reading achievement is higher than the students' arithmetic achievement. You will notice a reversal of this trend in all later batteries. Observe also that students did poorest in the Vocabulary subtest which is intended to measure knowledge of synonyms, simple definitions, ready associations and higher-level comprehension of the concepts represented by words. A relative deficiency in vocabulary areas is present throughout all battery levels.

Table Pr. I-B gives results for these same students according to hearing loss level. Notice that with the exception of the Spelling and Word Study Skills sub-tests, hearing loss level does not appear to affect achievement at the Primary I level. More definite and consistent relationships between hearing level and achievement begin to show in the Primary II battery, however. In Spelling and particularly Word Study Skills, achievement seems to be related to degree of hearing loss. Students who hear better, get better scores. This may be explained by the fact that both these sub-tests are dictated to students. Thus, their validity is limited for hearing impaired students as a group. It is suggested that results from these sub-tests be interpreted with this reservation in mind.

Table Pr. I-C shows student achievement levels by chronological age. Very little difference in achievement scores occurs from age to age within the battery. This appears due to the fact that students of relatively homogeneous ability were placed into this battery level by the screening test procedures.

Table Pr. I-D presents achievement test scores by the age of the students, classified by hearing loss level.

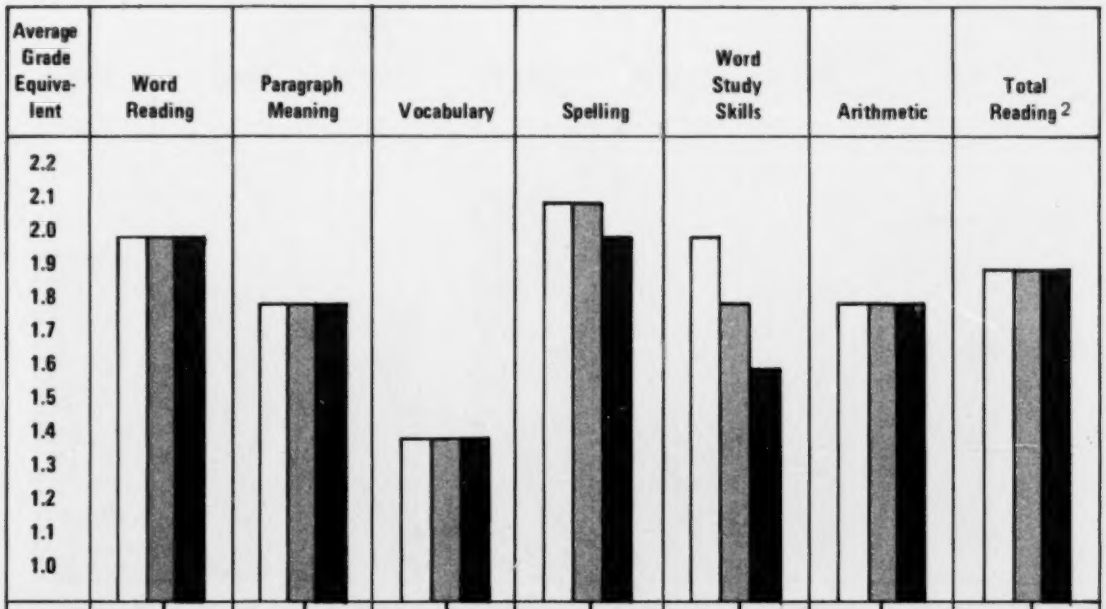
TABLE Pr. I-A: AVERAGE GRADE EQUIVALENT SCORES FOR HEARING IMPAIRED STUDENTS, PRIMARY I BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.



	Word Reading	Paragraph Meaning	Vocabulary	Spelling	Word Study Skills	Arithmetic	Total Reading[1]
Number	5,793	5,923	5,625	2,088	1,723	5,822	5,785
Average	2.00	1.80	1.38	2.04	1.75	1.77	1.88
Standard Deviation	.50	.34	.35	.59	.63	.37	.37

[1]Total Reading is derived from Word Reading and Paragraph Meaning.

TABLE Pr. I-B: AVERAGE GRADE EQUIVALENT SCORES BY HEARING LOSS LEVELS [1] FOR HEARING IMPAIRED STUDENTS, PRIMARY I BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.



Hearing Level	Word Reading		Paragraph Meaning		Vocabulary		Spelling		Word Study Skills		Arithmetic		Total Reading [2]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
59 dB & below	445	2.0	440	1.8	423	1.4	220	2.1	196	2.0	435	1.8	425	1.9
60-98 db	2,718	2.0	2,696	1.8	2,548	1.4	971	2.1	825	1.8	2,651	1.8	2,640	1.9
99 dB & above	1,643	2.0	1,635	1.8	1,548	1.4	504	2.0	394	1.6	1,597	1.8	1,613	1.9

□ 59dB & below ▒ 60-98 dB ■ 99db & above

[1] Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2] Total Reading is derived from Word Reading and Paragraph Meaning.

TABLE Pr. I-C: AVERAGE GRADE EQUIVALENT SCORES BY AGE FOR HEARING IMPAIRED STUDENTS, PRIMARY I BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age	Word Reading		Paragraph Meaning		Vocabulary		Spelling		Word Study Skills		Arithmetic		Total Reading[1]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages	5,973	2.0	5,923	1.8	5,625	1.4	2,088	2.0	1,723	1.7	5,822	1.8	5,785	1.9
Under 6	27	1.6	23	1.6	19	1.3	3	2.2	1	3.0	22	1.4	23	1.6
6	334	1.5	317	1.6	277	1.3	124	1.6	80	1.5	312	1.4	300	1.6
7	422	1.7	416	1.7	386	1.3	169	1.8	139	1.7	404	1.6	396	1.7
8	605	1.9	599	1.8	562	1.4	270	2.1	238	1.8	576	1.7	570	1.8
9	714	2.0	714	1.8	684	1.4	289	2.1	262	1.8	697	1.8	687	1.9
10	777	2.0	773	1.8	752	1.4	285	2.1	238	1.8	766	1.8	760	1.9
11	765	2.1	761	1.8	726	1.4	260	2.1	211	1.7	751	1.8	747	1.9
12	911	2.1	909	1.8	851	1.4	275	2.1	228	1.7	896	1.8	893	1.9
13	401	2.1	400	1.8	378	1.4	129	2.0	97	1.7	392	1.9	398	1.9
14	352	2.2	350	1.8	343	1.5	98	2.2	81	1.7	347	1.9	350	2.0
15	230	2.3	229	1.9	222	1.4	64	2.3	36	1.9	223	1.9	229	2.0
16	161	2.2	160	1.9	155	1.4	54	2.1	41	1.9	160	1.8	160	2.0
17	119	2.2	118	1.8	116	1.5	34	2.2	38	1.6	119	1.9	118	2.0
18	108	2.3	107	1.8	108	1.4	29	2.3	26	1.6	108	1.9	107	2.0
19 & Over	47	2.3	47	1.9	46	1.4	5	2.5	7	1.4	47	1.8	47	2.0

[1]Total Reading is derived from Word Reading and Paragraph Meaning.

TABLE Pr. I-D: AVERAGE GRADE EQUIVALENT SCORES BY AGE AND HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, PRIMARY I BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age and Hearing Threshold Levels	Word Reading		Paragraph Meaning		Vocabulary		Spelling		Word Study Skills		Arithmetic		Total Reading[2]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages														
59dB & below	445	2.0	440	1.8	423	1.4	220	2.1	196	2.0	435	1.8	425	1.9
60-98dB	2,718	2.0	2,696	1.8	2,548	1.4	971	2.1	825	1.8	2,551	1.8	2,640	1.9
99dB & above	1,643	2.0	1,635	1.8	1,548	1.4	504	2.0	394	1.6	1,597	1.8	1,613	1.9
Under six														
59dB & below	2	1.6	2	1.6	1	1.5	1	1.8	1	3.0	1	1.0	2	1.6
60-98dB	16	1.6	13	1.6	13	1.4	–	–	–	–	15	1.3	13	1.6
99dB & above	4	1.4	4	1.5	3	1.3	–	–	–	–	3	1.5	4	1.4
Age 6														
59dB & below	27	1.6	25	1.5	22	1.2	10	1.6	9	1.4	25	1.4	24	1.5
60-98dB	169	1.5	165	1.6	142	1.4	65	1.7	47	1.6	161	1.4	156	1.6
99dB & above	77	1.5	73	1.6	62	1.4	29	1.7	16	1.3	71	1.4	69	1.6
Age 7														
59dB & below	63	1.8	61	1.8	59	1.4	27	1.9	20	2.1	61	1.6	57	1.8
60-98dB	182	1.7	178	1.7	163	1.4	71	1.8	59	1.7	174	1.6	168	1.7
99dB & above	99	1.7	99	1.6	93	1.3	41	1.8	29	1.4	96	1.5	96	1.6
Age 8														
59dB & below	80	2.0	80	1.9	77	1.5	39	2.2	40	2.1	78	1.9	74	1.9
60-98dB	247	1.8	244	1.8	230	1.3	115	2.1	112	1.7	235	1.7	232	1.8
99dB & above	155	1.9	154	1.7	143	1.3	68	2.0	45	1.7	149	1.6	151	1.8
Age 9														
59dB & below	52	1.9	52	1.8	50	1.6	27	2.2	24	2.2	52	1.9	50	1.8
60-98dB	311	2.0	311	1.9	299	1.4	135	2.1	128	1.8	304	1.8	304	1.9
99dB & above	198	1.9	198	1.8	187	1.4	66	2.0	61	1.6	193	1.8	194	1.9
Age 10														
59dB & below	60	2.0	60	1.9	58	1.4	36	2.1	33	1.9	59	2.0	60	2.0
60-98dB	362	2.0	360	1.8	348	1.4	146	2.1	116	1.8	356	1.8	356	1.9
99dB & above	222	2.0	222	1.8	218	1.3	60	2.0	53	1.6	219	1.8	221	1.9
Age 11														
59dB & below	53	2.0	52	1.8	50	1.4	30	2.1	23	1.9	52	2.0	52	1.9
60-98dB	353	2.1	351	1.8	327	1.4	128	2.1	109	1.8	344	1.8	345	1.9
99dB & above	211	2.1	211	1.9	205	1.3	58	2.0	44	1.6	208	1.8	209	1.9

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2]Total Reading is derived from Word Reading and Paragraph Meaning.

TABLE Pr. I-D: (Continued) AVERAGE GRADE EQUIVALENT SCORES BY AGE AND HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, PRIMARY I BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age and Hearing Threshold Levels	Word Reading		Paragraph Meaning		Vocabulary		Spelling		Word Study Skills		Arithmetic		Total Reading[2]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
Age 12														
59dB & below	43	2.1	43	1.9	43	1.4	24	2.1	22	1.7	43	1.9	41	2.0
60-98dB	445	2.1	444	1.8	416	1.4	136	2.1	119	1.7	439	1.8	438	1.9
99dB & above	255	2.0	254	1.8	232	1.4	60	2.0	46	1.7	246	1.8	249	1.9
Age 13														
59dB & below	23	2.2	23	1.9	21	1.7	9	2.1	8	1.7	22	1.8	23	2.0
60-98dB	183	2.2	182	1.9	170	1.4	57	2.1	47	1.8	177	1.9	180	2.0
99dB & above	115	2.1	115	1.8	109	1.4	36	2.0	28	1.6	113	1.9	115	1.9
Age 14														
59dB & below	21	2.0	21	1.9	21	1.7	7	2.3	9	2.0	21	2.0	21	2.0
60-98dB	154	2.2	153	1.8	150	1.4	45	2.2	36	1.7	153	1.8	153	2.0
99dB & above	110	2.2	109	1.9	105	1.4	31	2.3	27	1.8	106	1.8	109	2.0
Age 15														
59dB & below	8	1.9	8	2.1	8	1.6	3	2.0	2	2.2	8	2.0	8	2.0
60-98dB	94	2.3	94	1.9	91	1.4	22	2.3	12	1.9	91	1.9	94	2.0
99dB & above	67	2.2	67	1.8	64	1.4	18	2.5	12	1.9	64	1.9	67	2.0
Age 16														
59dB & below	5	2.4	5	2.0	5	1.5	4	2.4	2	3.6	5	2.1	5	2.2
60-98dB	73	2.2	73	1.9	72	1.4	20	2.2	15	1.9	73	1.8	73	2.0
99dB & above	51	2.1	51	1.8	49	1.3	16	2.0	13	1.9	50	1.8	51	1.9
Age 17														
59dB & below	1	1.3	1	1.8	1	1.2	1	1.7	1	2.1	1	2.1	1	1.7
60-98dB	53	2.2	52	1.9	52	1.4	13	2.3	15	1.6	53	1.9	52	2.0
99dB & above	37	2.3	37	1.9	36	1.4	13	2.3	11	1.8	37	1.9	37	2.0
Age 18														
59dB & below	5	2.3	5	1.9	5	1.4	2	2.5	2	1.8	5	1.8	5	2.0
60-98dB	57	2.3	57	1.9	57	1.4	15	2.1	14	1.5	57	1.9	57	2.0
99dB & above	25	2.3	24	1.8	25	1.4	5	2.2	5	1.9	25	1.8	24	1.9
Age 19 and over														
59dB & below	2	3.0	2	2.4	2	2.2	–	–	–	–	2	1.4	2	2.6
60-98dB	19	2.2	19	1.9	18	1.3	1	2.2	2	1.4	19	1.8	19	2.0
99dB & above	17	2.2	17	1.8	17	1.3	3	2.7	4	1.4	17	1.7	17	1.9

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2]Total Reading is derived from Word Reading and Paragraph Meaning.

PRIMARY II BATTERY (FORM W-HI)
ACHIEVEMENT TEST RESULTS

This battery is designed for regular public school students from the middle of grade 2 to the end of grade 3. It was taken by approximately 35 percent of the hearing impaired students in this testing program.

Table Pr. II-A indicates that scores on the Arithmetic sub-test are generally higher than those on the reading sub-tests. This is a reversal of the findings from the Primary I battery and starts a trend which becomes more pronounced on higher test battery levels.

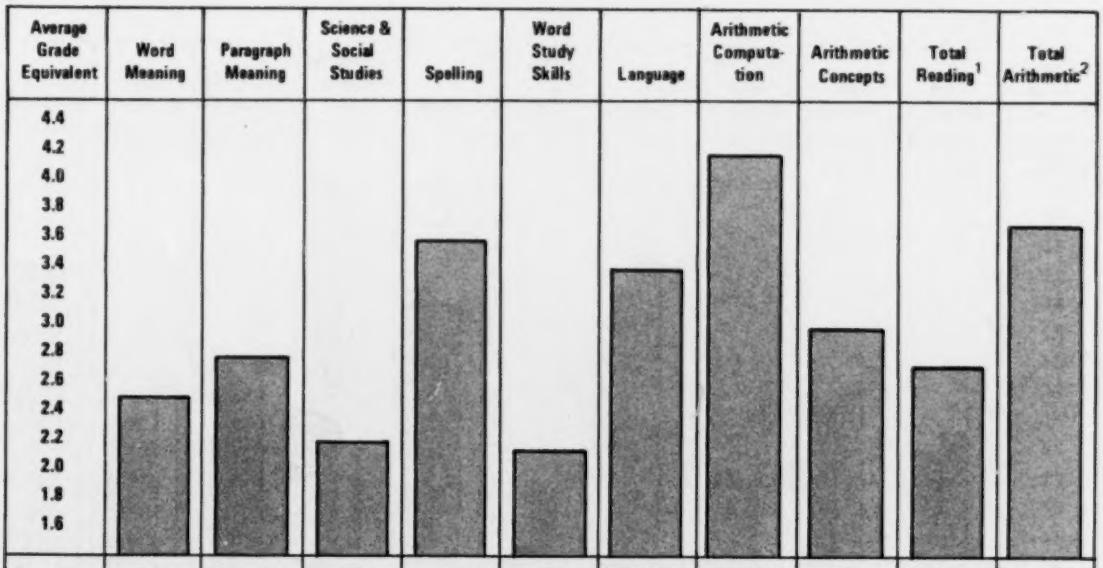
The overall patterning suggests that in early years of education, language learning and reading are emphasized over mathematics. At approximately the third grade level students pick up math rudiments and begin to achieve better in low verbal and non-verbal areas. Note, however, that Spelling scores are relatively high despite the fact that this sub-test is strictly dictated in this battery. The Spelling scores are relatively high throughout all the test levels suggesting this to be a strong area for hearing impaired students.

Table Pr. II-B, which gives these results by hearing loss levels, indicates another trend which also becomes more definite in later batteries. Students with better hearing do better in reading and word meaning (vocabulary) and students with more severe losses do poorer in these reading areas. A reverse of this achievement pattern is seen for non-reading areas. For example, students with more severe losses achieve better in arithmetic computation than do students able to hear better. Observe also that the greater the hearing deficit, the better the scores on the Language sub-test. This sub-test is measuring knowledge of the rules of capitalization, punctuation and proper word usage (i.e. given, gave). Throughout the Primary II and higher test levels, students with greater hearing losses show a better knowledge of the basic mechanical aspects of mathematics and language than do those with less severe hearing losses.

Performance on the Word Study Skills sub-test is markedly affected by hearing loss level. This test requires that the student be able to rhyme and associate sounds in order to answer the test items correctly. As expected, students with better hearing get better scores. Students with losses of 99dB and above score very near the chance or guessing level of this sub-test. The responses to the Word Study Skills questions are largely a function of the ability to hear. This sub-test would seem invalid for hearing impaired students.

Table Pr. II-C shows the average scores on each sub-test by the age of the students taking this battery along with the number of students for each category. Test performance for these same age groups according to hearing loss level is presented in Table Pr. II-D.

TABLE Pr. II-A: AVERAGE GRADE EQUIVALENT SCORES FOR HEARING IMPAIRED STUDENTS, PRIMARY II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

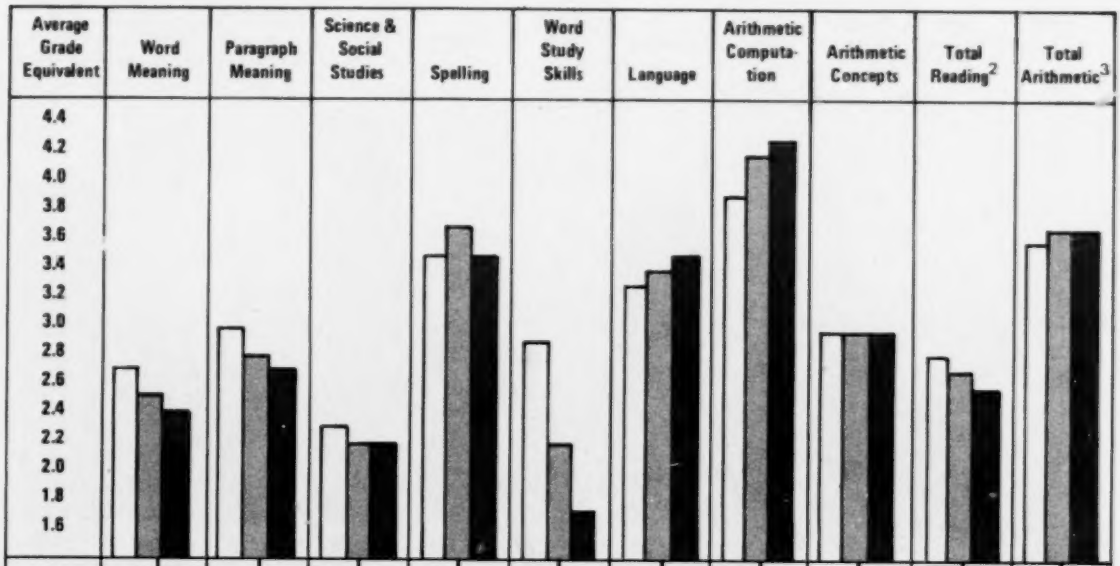


Average Grade Equivalent	Word Meaning	Paragraph Meaning	Science & Social Studies	Spelling	Word Study Skills	Language	Arithmetic Computation	Arithmetic Concepts	Total Reading[1]	Total Arithmetic[2]
Number	5,914	5,913	5,608	1,890	1,672	5,800	5,885	5,829	5,907	5,807
Average	2.50	2.78	2.23	3.62	2.15	3.44	4.22	3.02	2.67	3.71
Standard Deviation	.52	.55	.84	1.05	1.00	.98	1.30	1.01	.46	1.00

[1]Total Reading is derived from Word Meaning and Paragraph Meaning.

[2]Total Arithmetic is derived from Arithmetic Computation and Arithmetic Concepts.

TABLE Pr. II-B: AVERAGE GRADE EQUIVALENT SCORES BY HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, PRIMARY II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.



Hearing Level	Word Meaning No.	Word Meaning Aver.	Paragraph Meaning No.	Paragraph Meaning Aver.	Science & Social Studies No.	Science & Social Studies Aver.	Spelling No.	Spelling Aver.	Word Study Skills No.	Word Study Skills Aver.	Language No.	Language Aver.	Arithmetic Computation No.	Arithmetic Computation Aver.	Arithmetic Concepts No.	Arithmetic Concepts Aver.	Total Reading[2] No.	Total Reading[2] Aver.	Total Arithmetic[3] No.	Total Arithmetic[3] Aver.
59 dB & below	453	2.7	453	3.0	440	2.3	222	3.5	198	2.9	445	3.3	451	3.9	448	3.0	453	2.8	446	3.6
60-98 dB	2,797	2.5	2,798	2.8	2,650	2.2	886	3.7	810	2.2	2,745	3.4	2,781	4.2	2,751	3.0	2,794	2.7	2,736	3.7
99dB & above	1,655	2.4	1,654	2.7	1,583	2.2	483	3.5	425	1.7	1,629	3.5	1,648	4.3	1,629	3.0	1,652	2.6	1,625	3.7

□ 59dB & below ▨ 60-98 dB ■ 99dB & above

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2]Total Reading is derived from Word Meaning and Paragraph Meaning.

[3]Total Arithmetic is derived from Arithmetic Computation and Arithmetic Concepts.

TABLE Pr. II-C: AVERAGE GRADE EQUIVALENT SCORES BY AGE FOR HEARING IMPAIRED STUDENTS, PRIMARY II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age	Word Meaning		Paragraph Meaning		Science & Social Studies		Spelling		Word Study Skills		Language		Arithmetic Computation		Arithmetic Concepts		Total Reading[1]		Total Arithmetic[2]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages	5,914	2.5	5,913	2.8	5,608	2.2	1,880	3.6	1,672	2.1	5,800	3.4	5,885	4.2	5,829	3.0	5,907	2.7	5,807	3.7
Under 8	30	2.4	30	2.7	28	2.0	12	3.7	10	2.6	30	3.1	29	2.9	29	2.6	30	2.6	28	2.8
8	84	2.3	85	2.6	82	1.9	41	3.2	33	3.0	85	2.9	84	2.8	81	2.3	84	2.5	81	2.6
9	237	2.5	235	2.7	225	1.9	100	3.2	88	2.4	229	3.1	233	3.1	233	2.6	235	2.6	230	3.0
10	466	2.4	465	2.7	442	1.9	180	3.4	166	2.2	460	3.2	460	3.4	454	2.7	465	2.6	453	3.1
11	735	2.4	735	2.7	691	2.1	249	3.5	220	2.3	712	3.2	734	3.7	725	2.8	735	2.6	722	3.4
12	1,087	2.5	1,088	2.7	1,003	2.2	340	3.5	303	2.3	1,055	3.3	1,084	3.9	1,072	2.9	1,085	2.6	1,070	3.5
13	758	2.5	758	2.8	685	2.3	236	3.5	211	2.1	726	3.5	751	4.4	746	3.1	758	2.7	742	3.8
14	671	2.5	669	2.8	634	2.3	200	3.7	166	1.9	666	3.5	666	4.5	661	3.1	669	2.7	657	3.9
15	536	2.5	536	2.8	521	2.3	139	3.7	124	2.0	533	3.6	535	4.7	529	3.2	536	2.7	528	4.0
16	450	2.5	451	2.8	445	2.4	122	3.8	104	2.1	448	3.6	448	4.9	446	3.2	450	2.7	445	4.2
17	359	2.5	359	2.8	354	2.3	106	4.0	91	2.0	356	3.6	360	5.0	356	3.3	359	2.7	356	4.2
18	300	2.6	300	2.8	297	2.5	91	4.3	91	1.8	300	3.9	300	5.1	296	3.4	300	2.8	296	4.3
19	140	2.6	141	2.8	141	2.5	45	4.3	41	1.8	140	3.8	140	5.1	140	3.3	140	2.7	138	4.3
20 & Over	61	2.6	61	2.9	60	2.6	19	4.4	24	1.8	60	3.7	61	4.9	61	3.3	61	2.8	61	4.1

[1]Total Reading is derived from Word Meaning and Paragraph Meaning.
[2]Total Arithmetic is derived from Arithmetic Computation and Arithmetic Concepts.

TABLE Pr. II-D: AVERAGE GRADE EQUIVALENT SCORES BY AGE AND HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, PRIMARY II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age and Hearing Threshold Levels	Word Meaning		Paragraph Meaning		Science & Social Studies		Spelling		Word Study Skills		Language		Arithmetic Computation		Arithmetic Concepts		Total Reading[2]		Total Arithmetic[3]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages																				
59dB & below	453	2.7	453	3.0	440	2.3	222	3.5	198	2.9	445	3.3	451	3.9	448	3.0	453	2.8	446	3.6
60-98dB	2,797	2.5	2,798	2.8	2,650	2.2	886	3.7	810	2.2	2,745	3.4	2,781	4.2	2,751	3.0	2,794	2.7	2,736	3.7
99dB & above	1,655	2.4	1,654	2.7	1,583	2.2	483	3.5	425	1.7	1,629	3.5	1,648	4.3	1,629	3.0	1,652	2.6	1,625	3.7
Under 8																				
59dB & below	3	2.8	3	3.1	3	2.3	3	3.0	2	2.6	3	3.1	3	3.0	3	2.7	3	2.8	3	2.9
60-98dB	16	2.3	16	2.7	15	1.8	7	3.8	6	2.3	16	3.2	15	2.8	16	2.5	16	2.5	15	2.7
99dB & above	4	2.4	4	2.4	4	1.8	–	–	–	–	4	3.0	4	2.8	4	2.8	4	2.4	4	2.8
Age 8																				
59dB & below	24	2.6	24	2.9	24	2.1	13	3.5	12	3.3	24	3.2	24	2.9	24	2.6	24	2.8	24	2.8
60-98dB	38	2.3	39	2.5	39	1.9	19	3.2	16	3.1	39	2.8	39	2.7	37	2.2	38	2.5	37	2.5
99dB & above	17	2.1	17	2.4	14	1.5	7	2.8	3	2.4	17	2.8	16	2.7	15	2.0	17	2.3	15	2.4
Age 9																				
59dB & below	48	2.7	48	2.9	46	2.1	27	3.2	25	2.8	47	2.9	47	3.2	48	2.8	48	2.8	47	3.1
60-98dB	95	2.5	93	2.7	89	1.9	37	3.3	34	2.6	90	3.1	94	3.1	93	2.6	93	2.6	92	3.0
99dB & above	62	2.4	62	2.6	58	1.8	20	3.2	15	1.9	62	3.1	61	3.1	60	2.4	62	2.5	60	2.8
Age 10																				
59dB & below	59	2.6	59	2.9	56	2.1	30	3.4	19	2.8	58	3.1	58	3.4	56	2.8	59	2.8	56	3.2
60-98dB	212	2.5	212	2.8	205	1.9	81	3.6	74	2.2	212	3.2	208	3.4	207	2.7	212	2.7	206	3.2
99dB & above	130	2.3	129	2.7	118	1.9	36	3.3	42	1.9	128	3.3	129	3.3	126	2.7	129	2.5	126	3.1
Age 11																				
59dB & below	60	2.7	60	3.1	59	2.2	34	3.4	32	3.0	59	3.3	60	3.9	60	3.2	60	2.9	60	3.6
60-98dB	351	2.5	351	2.8	326	2.1	117	3.4	110	2.3	339	3.2	349	3.7	344	2.8	351	2.7	342	3.3
99dB & above	206	2.3	206	2.6	192	2.0	56	3.5	47	1.8	199	3.2	207	3.6	203	2.7	206	2.5	202	3.2
Age 12																				
59dB & below	84	2.8	84	3.1	80	2.6	48	3.5	45	2.9	81	3.4	84	4.1	84	3.2	84	3.0	84	3.7
60-98dB	543	2.5	546	2.8	507	2.1	162	3.7	151	2.4	529	3.3	544	3.9	536	2.9	543	2.7	535	3.5
99dB & above	270	2.3	268	2.6	251	2.2	75	3.2	67	1.8	260	3.4	268	3.8	265	2.9	268	2.5	264	3.5
Age 13																				
59dB & below	53	2.8	53	3.1	51	2.4	26	3.7	24	3.0	51	3.4	53	4.4	52	3.2	53	3.0	52	3.9
60-98dB	347	2.6	347	2.9	308	2.2	112	3.5	105	2.2	332	3.5	344	4.3	341	3.1	347	2.7	338	3.8
99dB & above	216	2.4	216	2.8	204	2.3	57	3.4	52	1.6	208	3.5	212	4.4	211	3.1	216	2.6	210	3.8
Age 14																				
59dB & below	39	2.6	39	2.8	39	2.3	16	3.5	17	2.8	39	3.1	38	4.0	39	2.9	39	2.7	38	3.6
60-98dB	301	2.5	300	2.8	283	2.3	92	3.8	75	1.8	299	3.5	298	4.4	296	3.1	300	2.7	293	3.9
99dB & above	194	2.5	194	2.8	189	2.3	55	3.5	44	1.6	193	3.6	193	4.5	191	3.0	194	2.7	191	3.9

[1] Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.
[2] Total Reading is derived from Word Meaning and Paragraph Meaning.
[3] Total Arithmetic is derived from Arithmetic Computation and Arithmetic Concepts.

TABLE Pr. II-D: AVERAGE GRADE EQUIVALENT SCORES BY AGE AND HEARING LOSS LEVELS[1] (continued) FOR HEARING IMPAIRED STUDENTS, PRIMARY II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age and Hearing Threshold Levels	Word Meaning		Paragraph Meaning		Science & Social Studies		Spelling		Word Study Skills		Language		Arithmetic Computation		Arithmetic Concepts		Total Reading[2]		Total Arithmetic[3]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
Age 15																				
59dB & below	27	2.6	27	2.9	27	2.3	8	4.3	10	2.5	27	3.3	27	4.7	27	3.3	27	2.9	27	4.1
60-98dB	251	2.5	251	2.8	244	2.3	69	3.7	55	2.3	250	3.6	250	4.7	246	3.2	251	2.7	245	4.0
99dB & above	163	2.6	163	2.8	160	2.4	45	3.8	43	1.7	163	3.8	164	4.9	162	3.3	163	2.7	162	4.2
Age 16																				
59dB & below	18	2.7	18	2.9	18	2.3	6	4.0	3	3.1	18	3.5	18	4.4	18	3.2	18	2.9	18	3.9
60-98dB	220	2.5	220	2.8	216	2.3	60	3.8	56	2.2	218	3.6	218	4.8	217	3.3	220	2.7	216	4.1
99dB & above	133	2.5	134	2.8	133	2.4	40	3.9	29	2.0	134	3.6	133	5.0	132	3.3	133	2.7	132	4.3
Age 17																				
59dB & below	11	2.4	11	2.9	10	2.2	2	3.2	2	1.3	11	3.7	11	4.8	10	3.1	11	2.8	10	4.0
60-98dB	196	2.6	196	2.9	193	2.4	61	4.2	53	2.2	194	3.7	196	5.0	194	3.4	196	2.8	194	4.3
99dB & above	102	2.4	102	2.7	102	2.2	35	3.6	29	1.5	102	3.5	103	4.9	102	3.1	102	2.6	102	4.1
Age 18																				
59dB & below	18	2.6	18	3.0	18	2.4	5	4.3	4	2.1	18	3.3	18	4.7	18	2.9	18	2.8	18	3.9
60-98dB	143	2.6	143	2.9	141	2.5	44	4.4	48	2.0	143	4.0	143	5.0	140	3.3	143	2.8	140	4.3
99dB & above	92	2.5	92	2.8	91	2.4	31	4.3	29	1.5	92	3.9	92	5.2	91	3.5	92	2.7	91	4.4
Age 19																				
59dB & below	6	2.7	6	2.8	6	2.1	3	3.6	2	2.6	6	3.4	7	4.7	6	3.1	6	2.8	6	4.1
60-98dB	60	2.6	60	2.8	60	2.4	19	5.1	18	2.0	60	3.8	59	5.2	60	3.2	60	2.7	59	4.2
99dB & above	48	2.7	49	2.8	49	2.6	17	3.6	15	1.5	49	4.0	48	5.2	49	3.5	48	2.8	48	4.4
Age 20 & Over																				
59dB & below	3	2.3	3	2.5	3	2.1	1	4.6	1	1.8	3	2.6	3	5.3	3	3.1	3	2.5	3	4.3
60-98dB	24	2.6	24	2.9	24	2.6	6	5.4	9	1.6	24	3.7	24	5.0	24	3.4	24	2.8	24	4.2
99dB & above	18	2.6	18	2.8	18	2.5	9	4.1	10	1.8	18	3.9	18	5.0	18	3.4	18	2.7	18	4.2

[1] Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2] Total Reading is derived from Word Meaning and Paragraph Meaning.

[3] Total Arithmetic is derived from Arithmetic Computation and Arithmetic Concepts.

INTERMEDIATE I BATTERY (FORM W)
ACHIEVEMENT TEST RESULTS

The Intermediate I battery is designed for regular public school students from the beginning of grade 4 to the middle of grade 5. The Intermediate I was taken by 17 percent of the hearing impaired students in the national testing program.

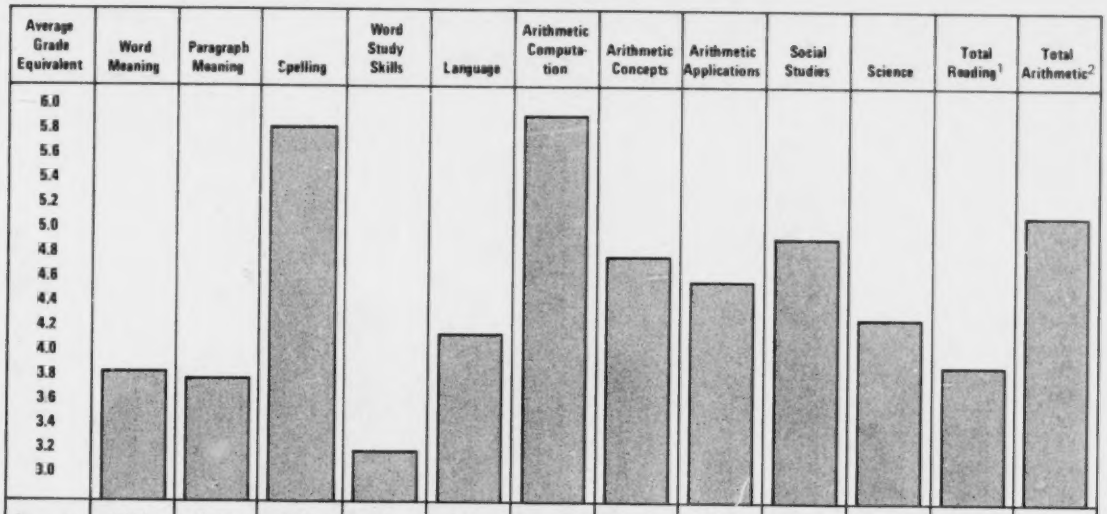
Table Int. I-A indicates that students showed the highest achievement in Arithmetic Computation. Poorest achievement is found in the Word Meaning and Paragraph Meaning sub-tests, which together, evaluate the students' overall reading ability. Generally, at the fourth grade level reading comprehension skills for hearing impaired students become relatively lower than other academic areas. This trend continues throughout the remaining test batteries.

The Word Study Skills sub-test shows the poorest performance. Results for this sub-test are not considered valid or meaningful however, since, as already noted, it measures the hearing impaired students' ability to identify the phonetic pattern of words.

Table Int. I-B analyzes performance on this battery according to hearing threshold levels. On the three sub-tests heavily related to reading comprehension (Word Meaning, Paragraph Meaning and Science) students with lower hearing losses do slightly better. Students with higher hearing losses have higher achievement in Spelling, Language, Arithmetic Computation, Arithmetic Concepts, Arithmetic Applications and Social Studies.

Table Int. I-C relates achievement scores to student age. It presents the average score obtained on each sub-test for students of a given age. Table Int. I-D shows the relationship of age and hearing loss level to achievement on the Intermediate I battery.

TABLE Int. I-A: AVERAGE GRADE EQUIVALENT SCORES FOR HEARING IMPAIRED STUDENTS, INTERMEDIATE I BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

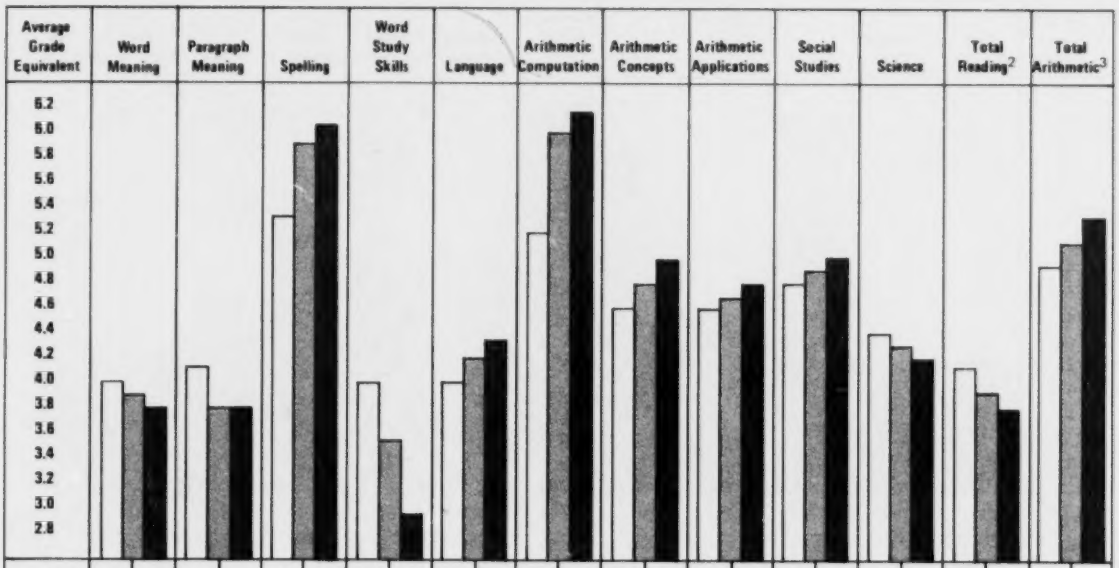


	Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Language	Arithmetic Computation	Arithmetic Concepts	Arithmetic Applications	Social Studies	Science	Total Reading[1]	Total Arithmetic[2]
Number	2,817	2,817	2,745	1,253	2,808	2,812	2,812	2,810	2,790	2,781	2,815	2,806
Average	3.87	3.83	5.84	3.23	4.15	5.92	4.81	4.64	4.92	4.25	3.86	5.12
Standard Deviation	.74	.84	1.51	1.25	1.17	1.59	1.37	1.26	.98	.81	.71	1.01

[1]Total Reading is derived from Word Meaning and Paragraph Meaning.

[2]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

TABLE Int. I-B: AVERAGE GRADE EQUIVALENT SCORES BY HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, INTERMEDIATE I BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.



Hearing Level	Word Meaning		Paragraph Meaning		Spelling		Word Study Skills		Language		Arithmetic Computation		Arithmetic Concepts		Arithmetic Applications		Social Studies		Science		Total Reading[2]		Total Arithmetic[3]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
59 dB & below	268	4.0	267	4.1	246	5.3	142	4.0	266	4.0	265	5.2	266	4.6	265	4.6	265	4.8	264	4.4	267	4.1	264	4.9
60-98 dB	1,413	3.9	1,414	3.8	1,380	5.9	618	3.3	1,410	4.2	1,414	6.0	1,412	4.8	1,412	4.7	1,403	4.9	1,401	4.3	1,413	3.9	1,410	5.1
99 dB & above	717	3.8	717	3.8	708	6.0	310	2.9	716	4.3	716	6.2	716	5.0	716	4.8	710	5.0	710	4.2	717	3.8	716	5.3

□ 59dB & below ▒ 60-98 dB ■ 99dB & above

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2]Total Reading is derived from Word Meaning and Paragraph Meaning.

[3]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

TABLE Int. I-C: AVERAGE GRADE EQUIVALENT SCORES BY AGE FOR HEARING IMPAIRED STUDENTS, INTERMEDIATE I BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age	Word Meaning		Paragraph Meaning		Spelling		Word Study Skills		Language		Arithmetic Computation		Arithmetic Concepts		Arithmetic Applications		Social Studies		Science		Total Reading[1]		Total Arithmetic[2]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages	2,817	3.9	2,817	3.8	2,745	5.8	1,253	3.2	2,808	4.1	2,812	5.9	2,812	4.8	2,810	4.6	2,790	4.9	2,787	4.2	2,815	3.9	2,806	5.1
Under 11	64	3.9	64	3.9	56	5.1	39	4.0	64	4.0	63	4.2	63	4.1	63	4.2	63	4.4	63	4.1	64	3.9	63	4.2
11	72	3.5	72	4.0	62	5.4	39	4.0	68	3.9	72	4.7	72	4.3	71	4.3	67	4.6	66	4.2	72	4.0	71	4.5
12	231	3.8	231	3.8	208	5.3	119	3.5	227	3.9	231	4.8	232	4.3	232	4.2	227	4.6	226	4.2	230	3.8	231	4.5
13	288	3.8	288	3.8	281	5.7	124	3.4	287	4.1	286	5.6	287	4.7	287	4.5	286	4.9	286	4.3	287	3.9	286	5.0
14	392	3.8	392	3.8	379	5.6	199	3.4	392	4.0	392	5.7	392	4.8	392	4.6	391	4.9	390	4.2	392	3.8	392	5.0
15	409	3.8	409	3.9	401	5.7	186	3.2	408	4.1	408	5.9	408	4.8	407	4.6	404	4.9	405	4.3	409	3.9	407	5.1
16	355	3.9	355	3.8	352	5.9	156	2.9	355	4.1	354	6.1	354	4.9	354	4.7	353	5.0	353	4.3	355	3.9	354	5.2
17	375	3.9	375	3.8	374	6.0	163	3.1	374	4.2	375	6.4	374	5.0	374	4.8	370	5.0	370	4.3	375	3.8	374	5.3
18	324	3.9	324	3.8	324	6.1	110	3.0	325	4.3	323	6.5	324	4.9	324	4.8	322	5.0	322	4.2	324	3.9	322	5.4
19	207	4.0	207	3.9	208	6.3	72	2.8	208	4.4	208	6.8	207	5.1	207	5.0	208	5.1	208	4.3	207	3.9	207	5.6
20	86	4.1	86	3.9	85	6.5	40	3.0	85	4.5	85	6.6	85	5.3	85	4.9	84	5.1	84	4.3	86	4.0	85	5.5
21 & Over	14	4.1	14	4.0	15	6.6	6	2.8	15	4.6	15	6.5	14	5.1	14	4.9	15	5.2	14	4.5	14	4.0	14	5.4

[1]Total Reading is derived from Word Meaning and Paragraph Meaning.
[2]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

TABLE Int. I-D: AVERAGE GRADE EQUIVALENT SCORES BY AGE AND HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, INTERMEDIATE I BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age and Hearing Threshold Levels	Word Meaning		Paragraph Meaning		Spelling		Word Study Skills		Language		Arithmetic Computation		Arithmetic Concepts		Arithmetic Applications		Social Studies		Science		Total Reading[2]		Total Arithmetic[3]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages																								
59dB & below	268	4.0	267	4.1	246	5.3	142	4.0	266	4.0	265	5.2	266	4.6	265	4.6	265	4.8	264	4.4	267	4.1	264	4.9
60-98dB	1,413	3.9	1,414	3.8	1,380	5.9	618	3.3	1,410	4.2	1,414	6.0	1,412	4.8	1,412	4.7	1,403	4.9	1,401	4.3	1,413	3.9	1,410	5.1
99dB & above	717	3.8	717	3.8	708	6.0	310	2.9	716	4.3	716	6.2	716	5.0	716	4.8	710	5.0	710	4.2	717	3.8	716	5.3
Under 11																								
59dB & below	20	4.2	20	4.2	17	4.8	13	4.3	20	4.0	19	4.2	19	4.3	19	4.4	19	4.5	19	4.2	20	4.2	19	4.3
60-98dB	29	3.9	29	3.9	25	5.4	17	4.4	29	4.1	29	4.4	29	4.3	29	4.2	29	4.6	29	4.2	29	3.9	29	4.3
99dB & above	6	3.7	6	3.5	6	5.5	3	2.9	6	4.0	6	4.8	6	3.8	6	4.0	6	4.4	6	3.9	6	3.6	6	4.2
Age 11																								
59dB & below	24	4.4	24	4.5	21	5.6	14	5.4	24	4.2	24	4.9	24	4.6	23	4.4	23	4.6	23	4.5	24	4.4	23	4.7
60-98dB	29	3.8	29	3.6	25	5.1	13	3.6	27	3.5	29	4.5	29	4.0	29	3.8	27	4.5	26	3.9	29	3.7	29	4.1
99dB & above	8	3.8	8	3.8	8	5.6	5	2.6	8	4.0	8	4.4	8	4.3	8	4.6	8	4.7	8	4.4	8	3.8	8	4.5
Age 12																								
59dB & below	43	4.1	42	4.0	35	5.0	22	4.1	42	4.1	42	4.7	43	4.5	43	4.1	43	4.6	43	4.2	42	4.1	42	4.4
60-98dB	111	3.7	112	3.6	102	5.4	54	3.5	109	3.8	112	4.7	112	4.1	112	4.1	109	4.5	109	4.1	111	3.7	112	4.3
99dB & above	43	3.8	43	3.6	38	5.4	28	3.0	42	4.0	43	5.0	43	4.5	43	4.2	42	4.7	42	4.2	43	3.7	43	4.6
Age 13																								
59dB & below	33	3.8	33	4.0	32	5.4	15	4.3	33	4.2	33	5.2	33	4.6	33	4.4	33	4.8	33	4.3	33	3.9	33	4.8
60-98dB	143	3.8	143	3.9	140	5.6	64	3.3	143	4.1	142	5.5	143	4.7	143	4.5	143	4.9	143	4.3	143	3.8	142	4.9
99dB & above	66	3.7	66	3.7	65	5.8	23	2.9	66	4.2	66	5.8	66	5.0	66	4.7	66	5.0	66	4.3	66	3.7	66	5.2
Age 14																								
59dB & below	32	4.2	32	4.6	26	5.4	19	4.2	32	4.0	32	5.5	32	4.8	32	4.9	32	5.1	32	4.6	32	4.4	32	5.1
60-98dB	200	3.8	200	3.8	194	5.6	103	3.5	200	4.0	200	5.7	200	4.8	200	4.6	200	4.9	199	4.2	200	3.8	200	5.0
99dB & above	85	3.6	85	3.7	85	5.6	41	3.2	85	4.0	85	5.9	85	4.8	85	4.6	85	4.9	85	4.0	85	3.7	85	5.1
Age 15																								
59dB & below	29	4.0	29	3.9	28	4.8	17	3.1	28	3.5	28	5.0	28	4.4	28	4.4	28	4.8	28	4.4	29	3.9	28	4.6
60-98dB	199	3.9	199	3.9	194	5.8	93	3.2	199	4.1	199	5.8	199	4.8	198	4.5	196	4.9	197	4.3	199	3.9	198	5.0
99dB & above	116	3.8	116	3.9	114	6.1	53	3.2	116	4.4	116	6.2	116	5.1	116	4.8	115	5.2	115	4.4	116	3.9	116	5.4
Age 16																								
59dB & below	27	4.0	27	4.1	27	5.2	13	3.6	27	3.9	27	5.6	27	4.8	27	4.9	27	5.0	27	4.4	27	4.1	27	5.1
60-98dB	168	3.9	168	3.9	166	6.0	69	3.1	168	4.2	168	6.1	168	5.0	168	4.8	166	5.0	166	4.3	168	3.9	168	5.3
99dB & above	102	3.8	102	3.7	101	5.9	44	2.6	102	4.1	101	6.0	101	4.8	101	4.7	102	4.9	102	4.2	102	3.8	101	5.2
Age 17																								
59dB & below	19	4.0	19	4.0	19	5.6	12	3.6	19	3.9	19	5.5	19	4.3	19	4.5	19	4.8	19	4.4	19	4.0	19	4.9
60-98dB	221	3.9	221	3.8	220	6.0	98	3.2	220	4.2	221	6.4	220	5.1	220	4.8	218	5.0	218	4.3	221	3.9	220	5.4
99dB & above	96	3.8	96	3.7	96	6.2	40	2.7	96	4.4	96	6.5	96	4.9	96	4.8	94	5.0	94	9.2	96	3.8	96	5.4
Age 18																								
59dB & below	28	4.1	28	4.0	28	6.2	9	3.2	28	4.0	28	6.1	28	5.1	28	4.8	28	4.7	27	4.3	28	4.0	28	5.3
60-98dB	169	3.9	169	3.8	169	6.0	52	3.2	170	4.3	169	6.4	169	4.9	170	4.7	170	5.0	170	4.2	169	3.9	169	5.3
99dB & above	86	4.0	86	3.9	86	6.4	36	2.8	86	4.6	86	6.8	86	5.2	86	5.0	84	5.2	84	4.2	86	3.9	86	5.6
Age 19																								
59dB & below	8	3.8	8	3.6	8	5.8	6	2.7	8	3.9	8	6.0	8	4.4	8	4.8	8	4.8	8	4.0	8	3.7	8	5.1
60-98dB	100	4.0	100	3.8	101	6.3	38	3.0	101	4.4	101	6.7	100	5.1	100	5.0	101	5.2	101	4.4	100	3.9	100	5.6
99dB & above	70	4.0	70	4.0	70	6.5	19	2.7	70	4.4	70	7.0	70	5.2	70	5.1	70	5.2	70	4.2	70	4.0	70	5.7
Age 20																								
59dB & below	4	4.0	4	3.8	4	6.4	2	3.4	4	4.7	4	6.8	4	5.3	4	5.8	4	4.9	4	4.4	4	3.8	4	5.8
60-98dB	39	4.2	39	4.0	38	6.7	16	3.6	38	4.7	38	6.9	38	5.5	38	5.2	38	5.3	38	4.4	39	4.1	38	5.8
99dB & above	34	4.0	34	3.9	34	6.5	15	2.4	34	4.5	34	6.3	34	5.1	34	4.8	33	5.2	33	4.3	34	4.0	34	5.3
Age 21 & Over																								
59dB & below	1	3.1	1	4.0	1	5.4	–	–	1	3.4	1	4.0	1	4.6	1	4.7	1	4.8	1	4.3	1	3.6	1	4.4
60-98dB	5	4.6	5	4.5	6	6.8	1	4.4	6	5.1	6	6.8	5	6.0	5	5.4	6	5.5	5	5.3	5	4.6	5	6.1
99dB & above	5	4.0	5	3.6	5	6.7	3	2.6	5	4.7	5	6.7	5	4.7	5	4.7	5	4.9	5	3.9	5	3.8	5	3.2

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.
[2]Total Reading is derived from Word Meaning and Paragraph Meaning.
[3]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

INTERMEDIATE II BATTERY (FORM W)
ACHIEVEMENT TEST RESULTS

The Intermediate II battery reflects the academic curriculum taught to normal hearing students from the middle of grade 5 to the end of grade 6. Of all hearing impaired students participating in the national testing program, 8.2 percent took this battery level.

Table Int. II-A summarizes the performance of all students on the different sub-tests of the Intermediate II. Keep in mind again, that had these data been obtained on a large number of hearing students, there would most likely be no differences among sub-tests. The Intermediate II battery continues to indicate wide differences in sub-test performance for hearing impaired students, however. We find here that the verbal complexity of the academic area measured appears to affect student performance. Students do well on low or non-verbal subject matters and proportionately less well as the verbal or reading level of the material becomes more complicated.

Notice that the Spelling sub-test showed the highest scores. On this test, four words appear in the test booklet for each question, one of which is misspelled. The student must recognize and identify the incorrectly spelled word. No reading skill is required. Second highest scores were obtained on Arithmetic Computation, a completely non-verbal sub-test. The Arithmetic Concepts sub-test and Arithmetic Applications sub-test which entail some reading skills but focus on arithmetic abilities are ranked third and fourth in difficulty. These are followed in increasing difficulty by the academic areas of Social Studies, Language, Paragraph Meaning, Science and Word Meaning respectively. Word Meaning, the most difficult academic area in this battery, assesses areas such as student knowledge of word synonyms, ready associations to words, and the students' higher level of comprehension of the concepts represented by words.

Table Int. II-B depicts performance on this battery as a function of hearing loss. Here too, is an indication that on strictly reading sub-tests, such as Word Meaning and Paragraph Meaning, students with better hearing obtain slightly better scores. This holds too, for achievement on the Science sub-test where performance is greatly related to reading. On all arithmetic sub-tests and the Language sub-test, however, students with higher losses do better than those with lower loss levels.

This table also shows the beginning of a curious trend. On the earlier batteries, students with greater hearing losses performed better on the Spelling and the Social Studies sub-tests than did students with relatively less hearing loss. On the Intermediate II level, however, this trend ceases to be decisive.

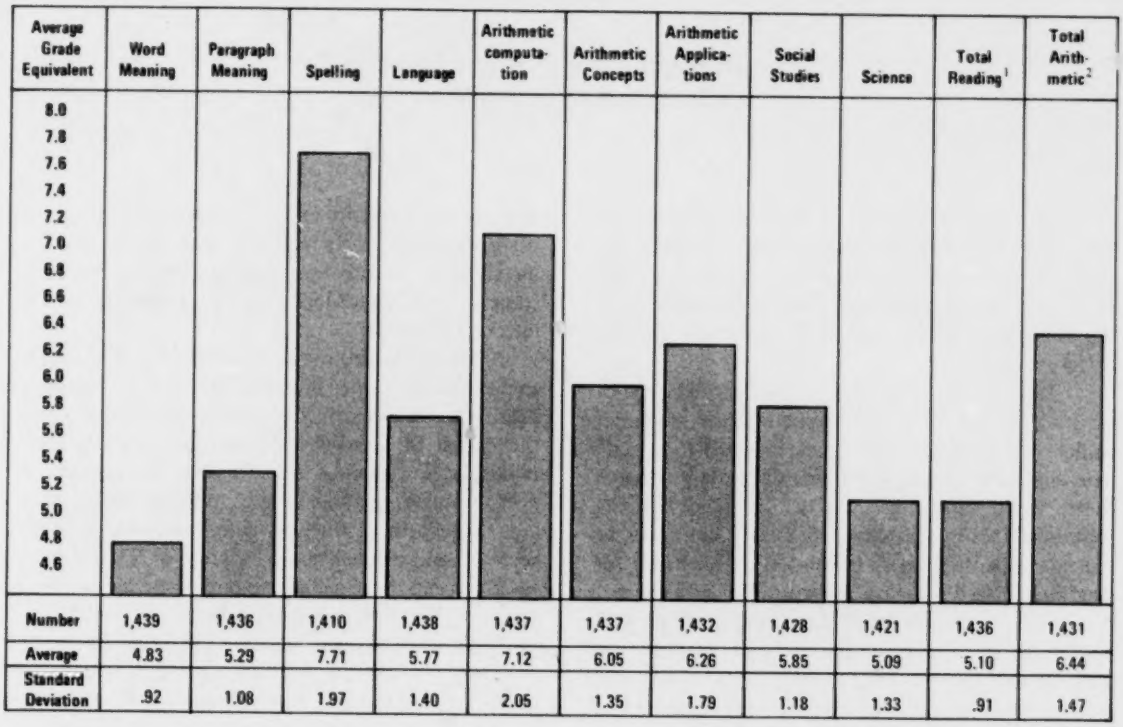
On Spelling, students with better ear averages of 59dB and below averaged a score of 7.0. There is no difference in Spelling among students with dB losses of 60-98dB and 99dB and above. Students in both of these categories averaged a score of 7.7.

On the Social Studies sub-test, the average grade equivalent score for students in each of the three hearing level categories was 5.8. At this battery level, and in this grade range, achievement on the Social Studies sub-test does not appear to be differentially affected by hearing loss.

Table Int. II-C gives results for the Intermediate II battery by specific ages. The smallest progress among scores from age to age occurs for the Paragraph Meaning and Word Meaning sub-tests. Both of these, of course, are direct measures of overall reading skill. This lack of differences in achievement by age is partly accounted for by the screening procedures described earlier and by the fact that reading is a very difficult area for hearing impaired students. Comparatively little progress in reading achievement is made from year to year. Note, however, that scores on non-reading tests such as Arithmetic Computation and Spelling show relatively larger achievement gains from year to year. Students are progressing more easily in these areas and a much wider range of achievement is reflected than on the pure reading tasks.

Table Int. II-D adds depth to understanding achievement on the Intermediate II battery by giving sub-test scores for each age as a function of hearing loss level.

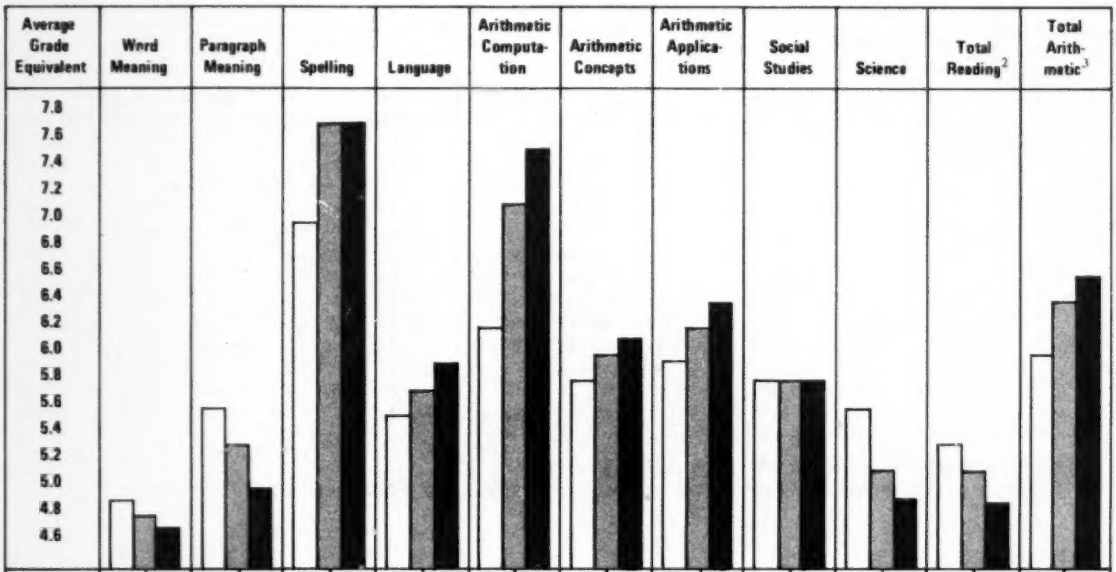
TABLE Int. II-A: AVERAGE GRADE EQUIVALENT SCORES FOR HEARING IMPAIRED STUDENTS, INTERMEDIATE II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.



Average Grade Equivalent	Word Meaning	Paragraph Meaning	Spelling	Language	Arithmetic computation	Arithmetic Concepts	Arithmetic Applications	Social Studies	Science	Total Reading[1]	Total Arithmetic[2]
Number	1,439	1,436	1,410	1,438	1,437	1,437	1,432	1,428	1,421	1,436	1,431
Average	4.83	5.29	7.71	5.77	7.12	6.05	6.26	5.85	5.09	5.10	6.44
Standard Deviation	.92	1.08	1.97	1.40	2.05	1.35	1.79	1.18	1.33	.91	1.47

[1]Total Reading is derived from Word Meaning and Paragraph Meaning.
[2]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

TABLE Int. II-B: AVERAGE GRADE EQUIVALENT SCORES BY HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, INTERMEDIATE II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.



Hearing Level	Word Meaning No.	Word Meaning Aver.	Paragraph Meaning No.	Paragraph Meaning Aver.	Spelling No.	Spelling Aver.	Language No.	Language Aver.	Arithmetic Computation No.	Arithmetic Computation Aver.	Arithmetic Concepts No.	Arithmetic Concepts Aver.	Arithmetic Applications No.	Arithmetic Applications Aver.	Social Studies No.	Social Studies Aver.	Science No.	Science Aver.	Total Reading[2] No.	Total Reading[2] Aver.	Total Arithmetic[3] No.	Total Arithmetic[3] Aver.
58dB & below	130	4.9	129	5.6	126	7.0	130	5.5	129	6.2	130	5.8	129	5.9	130	5.8	128	5.6	129	5.3	129	6.0
60-98 dB	761	4.8	760	5.3	747	7.7	760	5.7	761	7.1	761	6.0	758	6.2	753	5.8	749	5.1	760	5.1	757	6.4
99dB & above	328	4.7	328	5.0	321	7.7	328	5.9	328	7.5	327	6.1	327	6.4	326	5.8	325	4.9	328	4.9	327	6.6

□ 58dB & below ▒ 60-98dB ■ 99dB & above

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2]Total Reading is derived from Word Meaning and Paragraph Meaning.

[3]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

TABLE Int. II-C: AVERAGE GRADE EQUIVALENT SCORES BY AGE FOR HEARING IMPAIRED STUDENTS, INTERMEDIATE II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age	Word Meaning		Paragraph Meaning		Spelling		Language		Arithmetic Computation		Arithmetic Concepts		Arithmetic Applications		Social Studies		Science		Total Reading[1]		Total Arithmetic[2]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages	1,439	4.8	1,436	5.3	1,410	7.7	1,438	5.8	1,437	7.1	1,437	6.0	1,432	6.3	1,428	5.9	1,421	5.1	1,436	5.1	1,431	6.4
Under 12	40	4.8	40	5.3	36	6.3	40	5.4	40	5.3	40	5.7	39	5.1	40	5.3	39	4.9	40	5.1	39	5.4
12	66	4.8	64	5.4	61	6.5	66	5.4	65	5.4	65	5.2	64	5.5	66	5.3	63	5.0	64	5.1	64	5.4
13	84	4.9	84	5.4	80	6.9	83	5.4	84	5.8	84	5.6	83	5.7	83	5.7	82	5.2	84	5.2	83	5.7
14	117	4.9	117	5.6	115	7.5	117	5.8	117	6.7	117	5.9	117	6.2	117	5.9	117	5.5	117	5.3	117	6.2
15	215	4.9	215	5.3	212	7.4	215	5.8	215	7.2	215	6.1	215	6.5	214	5.8	214	5.2	215	5.1	215	6.5
16	210	4.8	210	5.3	205	7.8	210	5.8	209	7.2	208	6.2	208	6.4	208	5.9	208	5.1	210	5.1	208	6.6
17	238	4.7	238	5.1	236	7.7	238	5.7	238	7.2	239	6.1	239	6.2	236	5.9	235	4.9	238	4.9	238	6.4
18	248	4.9	248	5.3	246	8.3	248	5.9	248	7.6	248	6.2	248	6.4	243	5.9	242	5.1	248	5.1	248	6.7
19	152	4.9	152	5.3	151	8.3	152	6.0	152	7.8	152	6.2	151	6.4	152	6.1	152	5.0	152	5.1	151	6.8
20 & over	69	4.7	68	5.0	68	8.2	69	5.8	69	8.2	69	6.3	68	6.7	69	6.0	69	4.9	68	4.9	68	7.0

[1]Total Reading is derived from Word Meaning and Paragraph Meaning.
[2]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

TABLE Int. II-D: AVERAGE GRADE EQUIVALENT SCORES BY AGE AND HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, INTERMEDIATE II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age and Hearing Threshold Levels	Word Meaning		Paragraph Meaning		Spelling		Language		Arithmetic Computation		Arithmetic Concepts		Arithmetic Applications		Social Studies		Science		Total Reading[2]		Total Arithmetic[3]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages																						
59dB & below	130	4.9	129	5.6	126	7.0	130	5.5	129	6.2	130	5.8	129	5.9	130	5.8	128	5.6	129	5.3	129	6.0
60-98dB	761	4.8	760	5.3	747	7.7	760	5.7	761	7.1	761	6.0	758	6.2	753	5.8	749	5.1	760	5.1	757	6.4
99dB & above	328	4.7	328	5.0	321	7.7	328	5.9	328	7.5	327	6.1	327	6.4	326	5.8	325	4.9	328	4.9	327	6.6
Under 12																						
59dB & below	11	5.1	11	6.1	11	6.6	11	6.0	11	5.3	11	6.5	11	5.7	11	5.9	11	5.9	11	5.7	11	5.9
60-98dB	20	4.7	20	4.7	17	5.8	20	5.0	20	5.2	20	5.3	19	4.7	20	5.0	20	4.4	20	4.7	19	5.0
99dB & above	5	4.5	5	4.8	5	6.1	5	5.2	5	5.1	5	5.6	5	5.1	5	4.7	4	4.9	5	4.7	5	5.3
Age 12																						
59dB & below	13	4.7	12	5.4	12	5.6	13	4.7	12	5.1	13	4.8	12	5.2	13	5.0	12	5.4	12	5.1	12	5.1
60-98dB	34	4.9	31	6.7	33	5.6	34	5.7	34	5.4	33	5.4	33	5.6	34	5.6	32	5.2	33	5.2	33	5.4
99dB & above	9	4.3	9	4.8	8	6.6	9	5.0	9	5.6	9	5.2	9	5.5	9	4.8	9	4.2	9	4.6	9	5.5
Age 13																						
59dB & below	15	4.8	15	5.4	14	6.2	15	5.3	15	5.4	15	5.6	15	5.5	15	5.5	15	5.0	15	5.1	15	5.5
60-98dB	40	4.8	40	5.4	38	7.1	39	5.2	40	5.6	40	5.5	39	5.5	39	5.5	38	5.1	40	5.1	39	5.5
99dB & above	15	5.0	15	5.1	14	6.5	15	5.5	15	6.3	15	5.9	15	5.9	15	5.7	15	5.1	15	5.1	15	6.0
Age 14																						
59dB & below	16	5.0	16	5.7	16	7.0	16	5.7	16	5.8	16	5.8	16	5.8	16	5.7	16	5.4	16	5.4	16	5.7
60-98dB	64	4.9	64	5.6	63	7.6	64	5.9	64	6.7	64	5.8	64	6.4	64	5.9	64	5.6	64	5.4	64	6.3
99dB & above	18	4.8	18	5.2	18	7.8	18	5.6	18	7.4	18	5.9	18	6.3	18	6.1	18	5.2	18	5.1	18	6.5
Age 15																						
59dB & below	15	5.6	15	6.1	14	7.6	15	5.7	15	6.7	15	6.1	15	6.4	15	5.9	15	5.8	15	5.9	15	6.3
60-98dB	121	4.9	121	5.3	120	7.4	121	5.7	121	7.3	121	6.2	121	6.5	120	6.0	120	5.3	121	5.1	121	6.7
99dB & above	47	4.8	47	5.1	47	7.5	47	6.1	47	7.4	47	6.1	47	6.6	47	5.8	47	4.9	47	4.9	47	6.7
Age 16																						
59dB & below	17	4.8	17	5.4	17	7.2	17	5.5	17	6.4	17	6.0	17	5.7	17	5.5	17	5.1	17	5.2	17	6.0
60-98dB	102	4.9	102	5.3	99	7.7	102	5.8	102	7.3	102	6.2	102	6.5	102	5.8	102	5.1	102	5.1	102	6.6
99dB & above	49	4.5	49	5.1	47	7.9	49	6.0	49	7.5	48	6.3	48	6.5	48	6.1	48	4.9	49	4.9	48	6.7
Age 17																						
59dB & below	12	4.9	12	5.6	11	8.2	12	5.4	12	6.0	12	5.7	12	6.0	12	6.4	12	5.5	12	5.3	12	5.9
60-98dB	134	4.7	134	5.1	134	7.8	134	5.8	134	7.2	135	6.1	135	6.2	133	5.8	132	4.9	134	4.9	134	6.5
99dB & above	56	4.6	56	5.0	55	7.2	56	5.6	56	7.4	56	6.0	56	6.3	55	5.7	55	4.8	56	4.9	56	6.5

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2]Total Reading is derived from Word Meaning and Paragraph Meaning.

[3]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

TABLE Int. II-D: (continued) AVERAGE GRADE EQUIVALENT SCORES BY AGE AND HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, INTERMEDIATE II BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age and Hearing Threshold Levels	Word Meaning		Paragraph Meaning		Spelling		Language		Arithmetic Computation		Arithmetic Concepts		Arithmetic Applications		Social Studies		Science		Total Reading[2]		Total Arithmetic[3]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
Age 18																						
59dB & below	14	5.0	14	5.6	14	7.3	14	5.3	14	6.8	14	6.0	14	6.4	14	5.9	13	6.2	14	5.4	14	6.4
60-98dB	142	4.8	142	5.4	142	8.4	142	5.8	142	7.6	142	6.1	142	6.4	137	5.9	137	5.1	142	5.1	142	6.6
99dB & above	60	4.9	60	4.9	59	8.1	60	5.9	60	7.4	60	6.0	60	6.2	60	5.8	60	4.7	60	5.0	60	6.5
Age 19																						
59dB & below	13	5.0	13	5.8	13	7.9	13	6.2	13	7.9	13	6.3	13	6.7	13	6.5	13	6.1	13	5.4	13	6.9
60-98dB	75	5.0	75	5.3	74	8.3	75	5.9	75	7.4	75	6.1	74	6.2	75	6.0	75	4.9	75	5.1	74	6.6
99dB & above	47	4.9	47	5.1	47	8.3	47	6.2	47	8.5	47	6.5	47	6.7	47	6.0	47	5.0	47	5.1	47	7.1
Age 20 & Over																						
59dB & below	4	3.8	4	4.0	4	6.7	4	5.2	4	6.6	4	5.8	4	5.2	4	5.4	4	4.6	4	4.0	4	5.9
60-98dB	29	4.8	29	5.1	29	8.7	29	5.9	29	8.2	29	6.3	29	6.5	29	6.0	29	5.0	29	5.0	29	6.9
99dB & above	22	4.6	22	4.9	21	7.6	22	5.8	22	8.4	22	6.6	22	7.0	22	5.9	22	4.8	22	4.8	22	7.2

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.
[2]Total Reading is derived from Word Meaning and Paragraph Meaning.
[3]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

ADVANCED BATTERY (FORM W)
ACHIEVEMENT TEST RESULTS

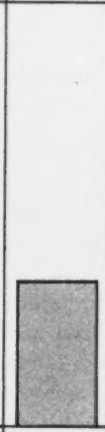
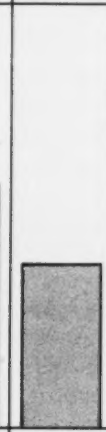
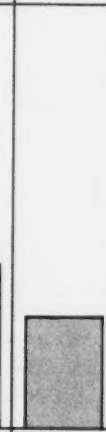
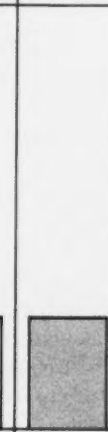
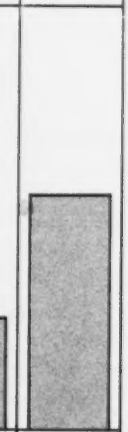
The Advanced battery, the highest test level used in this program, was designed for normal hearing students from the beginning of grade 7 to the end of grade 9. This battery level was administered to 4.3 percent of the hearing impaired students participating in the national achievement testing program.

Table Adv. A gives the overall student performance for this battery. As in earlier batteries, students show their best achievement on the Spelling and Arithmetic Computation sub-tests. Arithmetic Concepts, Arithmetic Applications and Language are next in order of difficulty. At the Intermediate I and II battery performance in Social Studies was higher than Science, but at the Advanced level, no difference appears between the performance of these two sub-tests. Students showed poorest achievement on the Paragraph Meaning sub-test which is typically used as a measure of reading comprehension.

Achievement on this battery, analyzed by hearing loss levels, is presented in Table Adv. B. As in earlier batteries, students with less severe losses do better on the Paragraph Meaning and Science sub-test. Some interesting changes in earlier trends also occur. As shown in the Spelling, Language and Arithmetic Computation sub-tests, students with more severe hearing losses are no longer achieving better than those with less of a hearing loss. The results of hearing loss level and achievement are mixed and show no clear trend for all sub-tests except Paragraph Meaning and Science which continue to demonstrate that academic reading areas are most affected by degree of hearing loss.

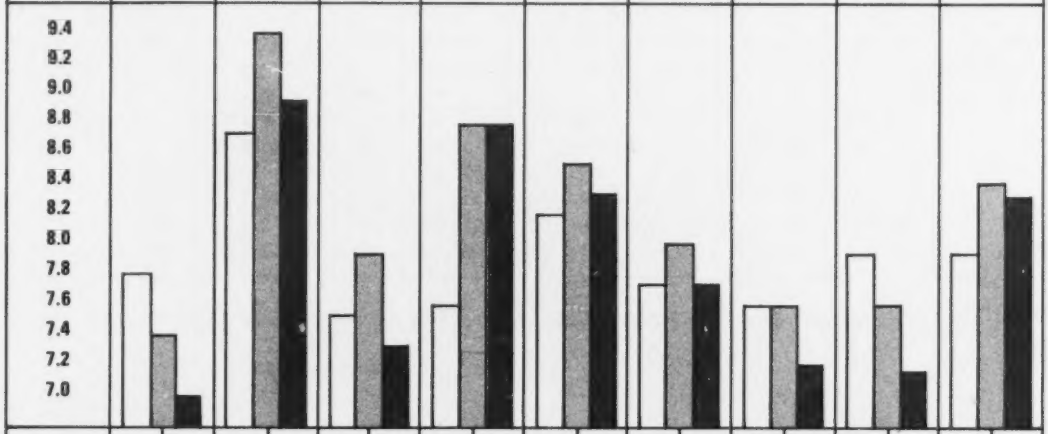
Table Adv. C shows achievement scores for the Advanced battery analyzed by student age. Table Adv. D shows a detailed breakdown of achievement, age and hearing loss level.

TABLE Adv. A: AVERAGE GRADE EQUIVALENT SCORES FOR HEARING IMPAIRED STUDENTS, ADVANCED BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Average Grade Equivalent	Paragraph Meaning	Spelling	Language	Arithmetic Computation	Arithmetic Concepts	Arithmetic Applications	Social Studies	Science	Total Arithmetic[1]
9.4 9.2 9.0 8.8 8.6 8.4 8.2 8.0 7.8 7.6 7.4 7.2 7.0									
Number	726	715	725	724	720	716	715	716	716
Average	7.33	9.24	7.67	8.65	8.41	7.84	7.50	7.48	8.35
Standard Deviation	1.91	2.39	2.14	2.39	2.12	2.10	2.04	2.02	1.99

[1]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts, and Arithmetic Applications.

TABLE Adv. B: AVERAGE GRADE EQUIVALENT SCORES BY HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS, ADVANCED BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.



Average Grade Equivalent	Paragraph Meaning		Spelling		Language		Arithmetic Computation		Arithmetic Concepts		Arithmetic Applications		Social Studies		Science		Total Arithmetic[2]	
Hearing Level	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
59dB & below	85	7.8	83	8.7	85	7.5	85	7.6	84	8.2	82	7.7	81	7.6	80	7.9	82	7.9
60-98 dB	390	7.4	384	9.4	389	7.9	389	8.8	386	8.5	384	8.0	386	7.6	387	7.6	384	8.4
99dB & above	179	7.0	178	8.9	179	7.3	179	8.8	179	8.3	179	7.7	178	7.2	178	7.1	179	8.3

□ 59dB & below ▒ 60-98dB ■ 99dB & above

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts, and Arithmetic Applications.

TABLE Adv. C: AVERAGE GRADE EQUIVALENT SCORES BY AGE FOR HEARING IMPAIRED STUDENTS, ADVANCED BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age	Paragraph Meaning		Spelling		Language		Arithmetic Computation		Arithmetic Concepts		Arithmetic Applications		Social Studies		Science		Total Arithmetic[1]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages	726	7.3	715	9.2	725	7.7	724	8.6	720	8.4	716	7.8	715	7.5	716	7.5	716	8.4
Under 15	71	7.7	68	8.8	71	7.7	70	7.5	70	8.1	68	7.8	69	7.7	69	7.7	68	7.8
15	63	7.7	62	8.9	63	7.8	63	8.3	63	8.1	62	7.9	61	7.5	61	7.7	62	8.2
16	138	7.2	135	9.0	138	7.3	138	8.1	136	8.3	136	7.7	136	7.4	136	7.5	136	8.0
17	149	7.4	145	9.6	149	8.0	150	9.0	149	8.6	149	7.9	149	7.7	150	7.6	149	8.6
18	173	7.4	173	9.6	173	7.8	173	9.2	173	8.7	173	7.9	171	7.6	172	7.4	173	8.7
19	102	7.0	102	9.1	102	7.5	101	8.8	101	8.4	100	7.9	101	7.3	100	7.2	100	8.5
20 & Over	30	6.4	30	8.6	29	7.0	29	8.8	28	8.0	28	7.4	28	6.4	28	7.0	28	8.2

[1]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts and Arithmetic Applications.

TABLE Adv. D: AVERAGE GRADE EQUIVALENT SCORES BY AGE AND HEARING LOSS LEVELS[1] FOR HEARING IMPAIRED STUDENTS' ADVANCED BATTERY, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age and Hearing Threshold Levels	Paragraph Meaning		Spelling		Language		Arithmetic Computation		Arithmetic Concepts		Arithmetic Applications		Social Studies		Science		Total Arithmetic[2]	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
All Ages																		
59dB & below	85	7.8	83	8.7	85	7.5	85	7.6	84	8.2	82	7.7	81	7.6	80	7.9	82	7.9
60-98dB	390	7.4	384	9.4	389	7.9	389	8.8	386	8.5	384	8.0	386	7.6	387	7.6	384	8.4
99dB & above	179	7.0	178	8.9	179	7.3	179	8.8	179	8.3	179	7.7	178	7.2	178	7.2	179	8.3
Under 15																		
59dB & below	18	7.7	18	7.9	18	7.2	18	7.0	18	8.0	17	7.8	17	7.6	17	7.4	17	7.7
60-98dB	32	8.0	29	9.7	32	8.3	32	7.3	32	7.9	31	7.8	32	7.9	32	8.1	31	7.7
99dB & above	12	7.2	12	8.2	12	7.9	12	8.3	12	8.2	12	7.7	12	7.5	12	7.4	12	8.1
Age 15																		
59dB & below	16	8.2	16	8.1	16	7.7	16	7.9	16	8.2	15	7.8	15	7.5	14	8.8	15	8.2
60-98dB	24	7.3	23	9.6	24	7.9	24	8.6	24	7.8	24	7.8	24	7.6	24	7.4	28	8.1
99dB & above	15	7.8	15	8.3	15	7.3	15	8.2	15	8.3	15	8.1	15	7.5	15	7.8	15	8.1
Age 16																		
59dB & below	15	7.7	13	8.9	15	7.5	15	7.4	14	8.2	14	7.4	14	7.3	14	8.1	14	7.7
60-98dB	71	7.4	70	9.1	71	7.6	71	8.2	70	8.4	70	8.1	70	7.8	70	7.9	70	8.3
99dB & above	34	7.0	34	8.9	34	7.0	34	8.0	34	8.1	34	7.5	34	7.0	34	7.1	34	7.9
Age 17																		
59dB & below	15	8.6	15	10.9	15	8.3	15	8.1	15	8.6	15	7.7	15	8.2	15	7.9	15	8.2
60-98dB	70	7.5	70	9.4	71	8.0	72	8.8	71	8.5	71	7.8	71	7.8	72	7.8	71	8.5
99dB & above	45	7.1	44	9.2	45	7.6	45	9.1	45	8.4	45	7.8	45	7.4	45	7.2	45	8.5
Age 18																		
59dB & below	14	6.8	14	7.9	14	7.1	14	7.8	14	8.0	13	7.7	14	7.4	13	7.2	14	7.8
60-98dB	110	7.6	110	10.0	110	8.0	110	9.3	110	8.8	110	8.2	110	7.9	110	7.6	110	8.8
99dB & above	40	7.0	40	8.8	40	7.4	40	9.3	40	8.3	40	7.4	39	7.0	39	6.9	40	8.4
Age 19																		
59dB & below	5	7.2	5	9.2	5	7.3	5	8.0	5	8.2	5	7.7	5	8.4	4	7.8	5	8.0
60-98dB	64	6.9	64	9.2	64	7.6	63	8.9	63	8.5	62	7.9	63	7.2	63	7.2	62	8.5
99dB & above	24	6.9	24	9.2	24	7.1	24	9.0	24	8.5	24	8.1	24	7.2	24	7.0	24	8.6
Age 20 & Over																		
59dB & below	2	8.1	2	8.1	2	6.8	2	7.7	2	6.6	2	8.0	2	7.6	2	8.6	2	7.4
60-98dB	18	6.6	18	8.5	17	7.1	17	8.9	16	8.3	16	7.1	16	6.4	16	6.9	16	8.2
99dB & above	9	5.8	9	8.7	9	6.7	9	8.8	9	7.7	9	7.2	9	6.0	9	6.6	9	7.9

[1]Average hearing threshold in better ear computed at 500, 1000, 2000 cycles per second. Excluded from the table are those for whom a better ear average could not be computed.

[2]Total Arithmetic is derived from Arithmetic Computation, Arithmetic Concepts, and Arithmetic Applications.

OVERALL GRADE EQUIVALENT AVERAGES ANALYZED BY AGE FOR PARAGRAPH MEANING AND ARITHMETIC COMPUTATION

There is much interest in the field of education of the hearing impaired concerning the educational achievement level of the typical student for a given age. For example, what is the average reading level of 16 year old students, or the arithmetic achievement of 18 year olders? The national level achievement information collected in this testing program sheds some light on these questions.

It must be understood that the problem of determining the average academic achievement for students of a given age is relatively difficult for individuals enrolled in educational programs for the hearing impaired. This stems from the fact of there being unusually wide differences in achievement among hearing impaired students of the same age. This variability appears due in part to the nature of hearing impairment, the age students began their education, type of educational services they receive, presence of additional handicapping conditions, and so on. Thus, students of the same age are commonly at different levels of education.

When this occurs, it is frequently necessary to administer different test levels to students of the same age. Achievement tests are designed to be valid only within a specific academic range. For example, the Primary II battery of the Stanford is designed to reflect curriculum for the middle of grade 2 to the end of grade 3. The Intermediate I battery is designed for the beginning of grade 4 to the middle of grade 5. As different battery levels were administered within the same age classification, it is necessary to combine the results from the different test levels to obtain an average score for the group. This procedure is acceptable and is commonly used. Statistically, it results in a "weighted average" achievement score wherein the scores for each battery are weighted according to the number of students taking the battery. The validity of the average scores is lowered by combining the results of more than one battery. The scores are still useful, however, for general achievement estimates and to depict trends of achievement from age to age.

In the following section, the performance of students from different batteries will be combined in order to present the "weighted average" achievement score for students of a common age. This procedure will be done for the academic areas of Paragraph Meaning and Arithmetic Computation. The reasons for selecting these areas are two-fold. First, they are commonly accepted as fundamentals of the academic curriculum. Second, the sub-tests measuring achievement in these areas are common to all five Stanford battery levels. That is, a Paragraph Meaning sub-test is included in each test level and Arithmetic Computation is in all levels except the Primary I. The Arithmetic sub-test of the Primary I does represent basic computational skills, however, and can be combined with the Arithmetic Computation sub-tests of the higher batteries. No other sub-tests or academic content areas are represented on all test battery levels of the Stanford. Though the Spelling sub-test occurs in the five test levels, it is dictated and thus it appears invalid for hearing impaired students at the Primary I and II level. Therefore, it is not meaningful to compute a weighted average using Spelling scores from the full Stanford Series.

The tables showing overall grade equivalents by student ages also give information regarding the percentile distributions of scores for each age. The percentile points shown are the 25th percentile, the 50th percentile and the 75th percentile. These points commonly are referred to as quartiles. Their interpretation is as follows: 25 percent of the students of a given age obtained a score equal to or below the score given as the 25th percentile while 75 percent of the students scored above this point; the 50th percentile grade equivalent is the point at which half of the students scored below and half scored above; 75 percent of students scored at or below the 75th percentile while 25 percent of the students obtained a score above the 75th percentile.

Weighted Grade Equivalent Averages by Student Age and Test Battery-Paragraph Meaning

Table E gives the results of the Paragraph Meaning sub-test analyzed by student age for each battery. It also presents a weighted average grade equivalent score for all students in each age group. An example for interpreting the table may be helpful here. The sample group of interest may be all ten year old hearing impaired students participating in this testing program. Table E shows that 773 of these students took the Primary I, 465 of them took the Primary II and so on. The "All Batteries Combined" column shows that in total, 1,290 Paragraph Meaning scores were obtained for 10 year olds and that the overall or weighted average score for this age group was a grade equivalent of 2.24. This indicates that the typical 10

TABLE E: WEIGHTED GRADE EQUIVALENT AVERAGES BY AGE AND BATTERY LEVEL FOR HEARING IMPAIRED STUDENTS, PARAGRAPH MEANING SUB-TEST, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age	Primary I Battery		Primary II Battery		Intermediate I Battery		Intermediate II Battery		Advanced Battery		All Batteries Combined		Percentile Distribution		
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	25th Percentile	50th Percentile	75th Percentile
All Ages	5,923	1.80	5,913	2.78	2,817	3.83	1,436	5.29	726	7.33	16,815	3.02	1.79	2.59	3.57
Under 6	23	1.61	2	3.70	*1	4.20	*1	4.30	–	–	27	1.96	1.39	1.56	1.91
6	317	1.59	3	2.00	2	3.85	*1	2.90	–	–	323	1.61	1.41	1.51	1.60
7	416	1.69	25	2.66	2	3.70	*1	5.20	*1	4.60	445	1.77	1.49	1.57	1.75
8	599	1.78	85	2.58	6	4.27	–	–	–	–	690	1.90	1.53	1.67	2.01
9	714	1.83	235	2.70	11	3.84	3	6.57	*1	10.70	964	2.09	1.60	1.77	2.36
10	773	1.83	465	2.71	42	3.83	9	5.46	*1	6.40	1,290	2.24	1.64	1.96	2.56
11	761	1.83	735	2.73	72	3.96	25	5.18	*1	8.20	1,594	2.40	1.71	2.15	2.78
12	909	1.81	1,088	2.74	231	3.76	64	5.39	13	7.83	2,305	2.58	1.75	2.38	2.94
13	400	1.82	758	2.84	288	3.85	84	5.40	16	7.23	1,546	2.95	2.00	2.75	3.34
14	350	1.84	669	2.81	392	3.82	117	5.60	38	7.87	1,566	3.18	2.17	2.85	3.64
15	229	1.88	536	2.81	409	3.86	215	5.30	63	7.73	1,452	3.54	2.44	3.04	4.19
16	160	1.85	451	2.83	355	3.85	210	5.32	138	7.23	1,314	3.85	2.55	3.27	4.67
17	118	1.84	359	2.83	375	3.79	238	5.11	149	7.43	1,239	4.02	2.71	3.54	4.86
18	107	1.84	300	2.84	324	3.82	248	5.29	173	7.37	1,152	4.23	2.78	3.83	5.28
19	35	1.89	141	2.81	207	3.86	152	5.29	102	6.99	637	4.36	2.92	4.02	5.29
20	10	1.70	47	2.86	86	3.90	52	5.04	25	6.34	220	4.12	3.03	3.91	4.86
21 & Over	2	2.35	14	2.88	14	3.97	16	5.02	5	7.00	51	4.23	3.08	4.02	5.26

*Those results are highly improbable and may reflect an error in scoring or the age given for the student who took the test.

year old hearing impaired student in this testing program was reading at the level of the typical hearing student in the second month of the second grade. The weighted reading average for the 1,546 thirteen year olds in this testing program was 2.95, and so on. Thus, this table gives an overall view of the progress and achievement in reading for hearing impaired students.

Notice the definite trend for reading achievement to improve as students progress in age through age 19. The reading ability of 20 year old students is slightly lower than that of 19 year olds. This drop in achievement for the much older students is a general trend present throughout all the sub-tests. It can most likely be explained by the fact that students 20 years old and above still in school are usually low achievers having academic difficulty.

Students appear to obtain the highest reading competence (grade equivalent of 4.36) at age 19. The table would also indicate a general reading growth for hearing impaired students of approximately 0.2 for each year. In interpreting this information it is to be kept in mind, however, that the validity of weighted average scores has been lowered by the statistical technique of combining the Paragraph Meaning scores from different test levels. Further, the validity of scores from 18, 19 and 20 year olders on the Primary I and II batteries is also questionable. These students may have obtained higher scores had they taken a higher test battery level in which the academic content was more appropriate to their age.

Weighted Grade Equivalent Averages by Student Age and Test Battery-Arithmetic Computation

The Arithmetic Computation sub-test of the Stanford measures the basic mechanics of arithmetic operations such as addition, subtraction, multiplication, division, fractions, decimals, percents, etc. The arithmetic operations become more difficult and reflect the curriculum of progressing grades as the test battery levels get higher. The questions on this sub-test are non-verbal and are thus considered to produce more valid results for hearing impaired students than do scores on the Paragraph Meaning sub-test.

The results of Arithmetic Computation, analyzed by age and individual battery level are given in Table F. This table also presents the combined or weighted grade equivalents for each age. The procedures for using this table are similar to those for Table E, showing overall reading scores. For example, the 766 ten year old students who took the Primary I obtained a grade equivalent average in Arithmetic Computation of 1.80. Also, the weighted grade equivalent for all ten year olds derived by combining scores from all batteries is 2.47. Using Table F in this manner, it is possible to estimate the arithmetic computation achievement of a large national group of hearing impaired students of successive ages.

Notice too, that student progression in arithmetic computation is relatively uneven. Slow gains were made from ages 6 to 9, averaging 0.25 grade equivalents per year. The greatest gains were made between the ages of 10 to 16, where students achieved on the average, 0.51 grade equivalents per year. The largest increase is shown between the ages of 12 and 13 where students gained approximately 0.82 grade equivalents. This table indicates that between the ages of 6 to 18, students gained on the average 0.40 grade equivalents per year.

Tables E and F clearly show that these students performed much better in arithmetic computation than in reading comprehension. This trend is consistent when analyzed by age. However, reading scores are higher from ages 6 to 8. From ages 9 to 12 arithmetic scores are higher by an average grade equivalent of 0.35. From ages 13 to 16, arithmetic scores average higher than reading by 1.42 grade equivalents. The greater differences appear from ages 17 to 20 where arithmetic averages were 2.00 grade equivalents higher than reading.

TABLE F: WEIGHTED GRADE EQUIVALENT AVERAGES BY AGE AND BATTERY LEVEL FOR HEARING IMPAIRED STUDENTS, ARITHMETIC COMPUTATION SUB-TEST, STANFORD ACHIEVEMENT TEST: SPRING 1971.

Age	Primary I Battery		Primary II Battery		Intermediate I Battery		Intermediate II Battery		Advanced Battery		All Batteries Combined		Percentile Distribution		
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.	25th Percentile	50th Percentile	75th Percentile
All Ages	5,822	1.77	5,885	4.22	2,812	5.92	1,437	7.12	724	8.65	16,680	4.09	1.86	3.69	5.54
Under 6	22	1.37	2	3.15	*1	5.70	*1	4.10	–	–	26	1.78	1.12	1.32	1.65
6	312	1.40	2	3.10	2	5.65	*1	8.50	–	–	317	1.46	1.11	1.32	1.53
7	404	1.56	25	2.82	2	5.30	*1	10.50	*1	6.60	433	1.68	1.26	1.50	1.74
8	578	1.70	84	2.77	6	3.10	–	–	–	–	668	1.85	1.42	1.67	1.99
9	697	1.78	233	3.14	11	3.96	3	3.47	*1	7.20	945	2.15	1.57	1.82	2.43
10	766	1.80	460	3.36	41	4.33	9	4.76	*1	5.10	1,277	2.47	1.66	1.97	2.98
11	751	1.83	734	3.69	72	4.72	25	5.46	*1	5.40	1,583	2.88	1.73	2.47	3.70
12	896	1.82	1,084	3.90	231	4.80	65	5.39	12	6.97	2,288	3.23	1.84	2.89	4.28
13	392	1.86	751	4.36	286	5.58	84	5.79	16	6.92	1,529	4.05	2.27	4.04	5.27
14	347	1.86	666	4.49	392	5.72	117	6.69	38	7.98	1,560	4.46	2.65	4.47	5.74
15	223	1.92	535	4.72	408	5.87	215	7.18	63	8.31	1,444	5.14	3.68	5.12	6.20
16	160	1.84	448	4.87	354	6.05	209	7.24	138	8.06	1,309	5.53	4.11	5.39	6.80
17	119	1.90	360	4.98	375	6.40	238	7.19	150	9.04	1,242	6.03	4.59	5.77	7.19
18	108	1.86	300	5.09	323	6.49	248	7.55	173	9.23	1,152	6.33	4.75	6.02	7.74
19	35	1.85	140	5.13	208	6.81	152	7.82	101	8.85	636	6.73	5.23	6.35	8.22
20	10	1.67	47	4.79	85	6.57	53	8.15	24	9.06	219	6.62	5.14	6.15	8.05
21 & Over	2	1.75	14	5.17	15	6.53	16	8.52	5	7.78	52	6.71	5.30	6.60	8.32

*These results are highly improbable and may reflect an error in scoring or the age given for the student who took the test.

SUMMARY

This publication presents the results of approximately 17,000 achievement tests administered in the Spring of 1971 to students enrolled in special educational programs for the hearing impaired. The Stanford Achievement Test Series were used as the measuring instruments. A description of the standardized testing procedure developed for the hearing impaired is given along with qualifications and limitations inherent in the testing results themselves. These limitations stem from the fact that the Stanford Tests were validated on normally hearing students attending regular school programs.

The results show that in the first 1 to 3 years of their education, hearing impaired students perform slightly better in reading areas than in other subjects. This appears to reflect the great emphasis given beginning students in vocabulary and basic reading ability. At about the middle of the second grade level the academic areas of arithmetic, spelling and language mechanics, such as punctuation, capitalization etc., begin to surpass reading comprehension. The trend for higher performance in non-verbal and low verbal academic areas continues through all student age groups.

For the most part, students do poorest in reading comprehension ability and best on those low verbal areas such as arithmetic. This may result from a language deficit whereby students can most effectively study academic material which does not require a high reading level.

The effect of hearing loss level on achievement was also studied. Aside from the Word Study Skills sub-test, hearing loss affects reading comprehension most directly. Students with the most severe hearing losses performed poorer on reading tests than did others with less severe hearing losses.

The reverse of this occurs for the low verbal academic areas. Students with greater hearing losses perform better in mathematics and in areas where reading is not required for achievement. This trend is present for the entire range of student ages but becomes less decisive for those older students who are exceptionally high achievers.

This report also suggests ways in which to make use of the achievement testing data. Teacher and educational planners may compare the performance of their students to the national group of hearing impaired students. Also, the data can be analyzed to shed light on sub-test patterning for various student ages and hearing threshold levels. In this way it can be used for educational diagnostics and improvement of educational services.

The Annual Survey has much more data on the results of the Achievement Testing Program, Spring 1971. Not all of it could be published here. The interested reader should contact the Annual Survey to request more specific test data or test distributions for more particular purposes.

APPENDIX I

The Annual Survey of Hearing Impaired Children and Youth

BACKGROUND AND PURPOSE

The Annual Survey of Hearing Impaired Children and Youth began its activities in May 1968. The program is established as a permanent research organization to collect, process and disseminate data on hearing impaired individuals through college age in the United States. The need for such information has been of prime concern to educators, audiologists, legislators, psychologists and others.

The Division of Research, Bureau of Education for the Handicapped, Office of Education, Department of Health, Education, and Welfare initiated the Annual Survey and provides the major share of its funding. Two preceding years of pilot and developmental work in a five state area determined the operational feasibility of the program. The Annual Survey is conducted by the Office of Demographic Studies of Gallaudet College.

The long range goal of the Annual Survey is to collect data on the entire hearing impaired population through college age in the United States. For operational reasons the hearing impaired population has been divided into three groups:

GROUP A: . Hearing impaired individuals who are receiving special educational services related to their hearing loss

GROUP B: Individuals who have been diagnosed as being hearing impaired but who are not receiving any special educational services

GROUP C: Individuals in the general population who, in fact, are hearing impaired but their hearing loss has not been diagnosed at a given point in time.

To this point in its work, the Annual Survey has devoted its resources almost totally to collecting and disseminating information on Group A.

The primary interest of this national program is in those kinds of data that can serve to improve and expand the educational opportunities available to hearing impaired individuals. The program encourages the use of its data by administrators, researchers, and other professionals providing services to the hearing impaired, as well as by any individual or group devoted to improving the results of special education for hearing impaired people.

POLICIES

In its attempt to provide useful information to those interested in hearing impaired children and youth, the Annual Survey has the benefit of the guidance and advice of its National Advisory Committee. Among its members are hearing and deaf individuals, administrators, researchers, teachers, and specialists from other areas within the field of hearing impairment. Every attempt is made to maintain a wide diversity of interests and competencies, as well as geographic representation, among its members. On questions of a technical nature, consultants from specialized fields are utilized as particular needs arise.

While permanent and national in scope, the Annual Survey does not aim at replacing or absorbing the work of other programs at the state or local level which are devoted to the collection and dissemination of information on hearing impaired children and youth. Rather, it seeks to facilitate their work through cooperation whenever this is feasible. Nor does the Annual Survey view itself as the center for

all types of research in this field. It focuses its activities on collecting and disseminating limited kinds of information on selected topics. It seeks to make available to outside researchers the vast amount of data it possesses and any special services it is feasible to render to them.

One restriction which is observed by the Survey is that no data will be released which permits the identification of an individual student or cooperating program. Exception to this only occurs where a written release is obtained from the program supplying the data Otherwise, independent researchers using the data of the Annual Survey have access only to summary statistics or coded information.

Since the Annual Survey attempts to promote the use of its data by those whose judgments and decisions will have a direct or indirect bearing on the education of hearing impaired individuals, it recognizes a responsibility to devote a part of its resources to the evaluation of the quality of the data collected and disseminated. This is particularly important because it seeks to establish national norms on the basic characteristics of hearing impaired children and youth. Thus, in its dissemination of information, the Annual Survey makes every effort to properly qualify its data and indicate any limitation associated with it.

The Annual Survey seeks to avoid associating itself with any established position relating to controversial issues within the field of educating hearing impaired individuals. Thus, it does not interpret its own data. Rather, it seeks to facilitate the use of its data by reputable individuals or organizations that may themselves wish to draw policy implications or test research hypotheses that are related to these issues.

DATA COLLECTION

During the first year of the Survey, the 1968-69 school year, data collection activities were directed towards all schools for the deaf and a representative sample (15 percent) of all special classes. In addition, records on students who were receiving itinerant services were obtained in total from two states and in part from several states. In all 25,363 individual records were collected.

Each year the Survey has steadily increased its coverage of the population. Over 550 reporting sources with approximately 41,000 students enrolled in their programs cooperated with the Annual Survey for the 1970-71 school year. It is expected that for the 1971-72 school year, data will be received on about 46,000 hearing impaired students throughout the country from about 750 reporting sources.

PROGRAM SERVICES AND PUBLICATION OF THE DATA

The program is accumulating a large volume of statistical data. The processing and dissemination of these data hold wide implications and potential benefits for educational, audiological, medical, psychological, legislative and other services to the hearing impaired. Towards the goal of fully utilizing the data, the program will make data available to independent investigators for research purposes, including masters' theses, doctoral dissertations, institutional level research programs, private studies, etc. Competent researchers are encouraged to propose detailed analyses of the data to further increase its usefulness.

The Annual Survey has conducted two National Academic Achievement Testing Programs, the first in the Spring of 1969 and the second in the Spring of 1971. The Annual Survey supplied testing materials and scoring services free of charge to participating programs. Data collected from these special studies have been published and continue to be analyzed. A reliability study also was conducted in conjunction with the most recent Achievement Testing Program and this evaluation study will help to determine the reliability of an achievement test designed for hearing students when used by hearing impaired students.

The Survey Office also provides each participating school or program with tabulations of the characteristics of their own students. The participating programs may obtain a set of punch cards containing the information submitted on each of their students. Further, the Annual Survey Office is available to provide consultation services to particular schools or school systems that are concerned with gathering and processing data on their students.

Participation in the Survey has led many of the programs to examine their current forms and record-keeping procedures. This led to requests that the Survey develop a uniform record form to keep student information for use in schools and classes throughout the country. Such a form was developed and used on a trial basis by a few schools during the 1970-71 school year. On the basis of this experience, the form was revised and distributed for use during the 1971-72 school year. Indications are that approximately half of the educational programs for the hearing impaired in the United States are using the form during the 1971-72 school year.

The Annual Survey also has conducted a survey of the fifty states. The state departments of either Education or Health were contacted for information

on their particular state. Among the types of information sought were: (1) description of services available to hearing impaired children and youth, (2) types of screening programs now in existence, (3) the referral system for those found to have a hearing loss, (4) the number of students receiving special services, and (5) the type of legislation relating to hearing impaired students.

The Annual Survey reports much of the data in a series of publications A listing of the publications to date appears on the inside back cover of this report.

FUTURE PLANS

During the early stages of the program, the Annual Survey devoted most of its resources to gathering basic demographic information on hearing impaired students, and to extending its coverage of these students to its current level. It is now in the process of formulating future plans, with the intention of beginning to collect information on selected topics of special interest to those in the field.

It is anticipated that the Survey will begin to collect data on the institutions themselves and the auxiliary services available to the students at the schools. Sample studies are planned in which the families of the hearing impaired students will supply information to the Survey.

Meanwhile, the Annual Survey will continue its efforts to produce an achievement test appropriate for hearing impaired students. Also being considered is the feasibility of developing measures of student performance in other areas beside academic achievement.

The initial success of the Annual Survey can be measured only in terms of the levels of participation and interest expressed by many individuals. The ultimate success will be measured not in terms of volume of data that will be collected and published, but in terms of its contributions to improving educational and other opportunities for hearing impaired children and youth.

APPENDIX II

STANDARDIZED TESTING PROCEDURES DEVELOPED FOR THE SPRING 1971 ACHIEVEMENT TESTING PROGRAM

The analyses of data collected from the 1969 achievement testing program indicated that different methods of administering the tests were being used among individual school and class programs. As test scores can be affected by the manner in which the test is given, it became necessary to establish uniform testing procedures. This served the purpose of making test administration procedures consistent throughout the schools and classes participating in the Spring 1971 testing program. It also ensured that test scores would be comparable from teacher to teacher and school to school. A description of the standardized procedures implemented to collect the data in this report is given below.

SCREENING TESTING OR PRE-TESTING OF STUDENTS

Analyses of the 1969 testing data demonstrated that many sub-tests, particularly at the Intermediate and Advanced battery levels, were not showing true differences between good and poor students. This occurred mainly because students were receiving test battery levels too high or too difficult for them. The number of items they were able to answer correctly was insufficient to show actual achievement differences, and scores tended to cluster about a chance or guessing range.

This guessing factor may result in a student's score being spuriously affected by the test battery level he receives. Generally, by guessing alone, the higher the battery level administered, the higher will be the scores. For example, if a beginning first grade student were administered the Social Studies sub-test of the Advanced Battery, and merely guessed at each question, he would likely receive a 4.6 Grade Equivalent score. The criteria used to select test battery levels for students varied throughout the country. It was therefore necessary to establish valid battery selection methods that would be consistent among the participating schools. A Screening Testing procedure was implemented to accomplish this goal.

The selection of the screening test was, for the most part, based on the internal analyses of the 12,000 achievement records collected two years earlier. The search was to find one sub-test within the Stanford Series which best indicated how well a student would perform on the remainder of the sub-tests in the full battery. On the basis of various statistical analyses, the Paragraph Meaning sub-test consistently proved to be the best predictor of overall student performance. In setting the specifications for using a Paragraph Meaning score to select the full battery, statistical adjustments were made which allowed for the fact that younger students generally scored higher in reading than on other test content areas, while older students scored relatively lower on reading than in the remainder of the test, e.g., arithmetic computation.

Two levels of Screening Tests were used, one appropriate for students achieving at a general level of the end of the fourth grade and below, and one for students estimated to be functioning at the beginning fifth grade level and above. In ordering screening test materials, the participating programs were asked to estimate the number of students maintaining a general academic level within each of these broad categories. The Paragraph Meaning sub-test from the Primary II and Intermediate II batteries of the Stanford Series, Form X, were employed as the screening instruments. The school administered and scored the screening test. The number of items the student answered correctly was used to select the most valid battery level for him. Guidelines for using screening test scores were formulated and set by the Annual Survey.

PRACTICE TESTING TO INSTRUCT STUDENTS IN TEST TAKING PROCEDURES

The directions to administer parts of the Stanford Tests and the question-answer format of some test items proved difficult to follow, for many students in special programs for the hearing impaired. They lacked exposure to this type of testing procedure. In analyzing the 1969 achievement test results, it became clear that many students took the test not understanding the test structure or how to mark their answers. The seriousness of this problem led the Annual Survey to develop sets of practice tests appropriate to each battery level of the Stanford Series. Samples of the test directions, questions, and answer marking procedures were included in the practice materials, along with an explanation of the purposes of academic achievement testing. Teacher manuals were developed to accompany the practice tests.

Participating programs received a practice test for each student and were requested to administer them two to four days prior to the Stanford full batteries. The practice tests were to be used directly to teach test-taking mechanics to the students and prepare them for their best performance on the real test. As the teachers gave the practice session, they too became better prepared for administering the Stanford Tests.

SPECIAL EDITION OF THE PRIMARY LEVEL TEST BATTERIES

The Primary I and II test levels, those intended for the academic range of the middle of grade 1 to the end of grade 3, contain many sub-tests structured to be administered by oral presentation. A hearing impaired student's response to a dictated question may be a function of his receptive communication skill and not his knowledge of the answer. Previously, schools attempted various procedures to overcome this problem – overheads, blackboards, and the like. To standardize presentation of the dictated sub-tests and make their design more valid, the Annual Survey arranged with the test authors and publisher for a special edition. This applied to the Primary I and II. levels only and was called Form W-HI. The Intermediate and Advanced test levels are self-administering and contain no dictated test questions.

Within the Form W-HI edition, those test questions previously to be strictly dictated were also printed in the test booklet itself. The teacher was to dictate the question and then direct the student to read it in his own booklet before marking his answer. The procedure served to make uniform the administration of dictated sub-tests. In the Primary I, Form W-HI, modifications were made in the Vocabulary and Arithmetic sub-tests. The Science and Social Studies Concepts and Arithmetic Concepts sub-tests were modified at the Primary II level, Form W-HI.

APPENDIX III

CHARACTERISTICS OF STUDENTS PARTICIPATING IN THE ACHIEVEMENT TESTING PROGRAM AND THE ANNUAL SURVEY OF HEARING IMPAIRED CHILDREN & YOUTH

Included here is a summary of the demographic characteristics of the students for whom achievement test results have been reported. Also shown are the distributions for these variables on the 41,109 students who participated in the Annual Survey of Hearing Impaired Children and Youth during the 1970-71 school year.

Preceding each table is the definition of the variable presented in the table.

AGE

The age of the students is the age as of December 31, 1970.

Age of Students	Students in the Achievement Testing Program		All Students in the Annual Survey of Hearing Impaired Children & Youth	
	Number	Percent	Number	Percent
Total	16,908	100.0	41,109	10.0
Under 6 Years	31	.2	5,387	13.1
6 - 9 Years	2,463	14.6	12,119	29.5
10 - 13 Years	6,760	40.0	12,275	29.9
14 - 17 Years	5,587	33.0	8,661	21.1
18 Years & Over	2,067	12.2	2,667	6.5

BETTER EAR AVERAGE

The better ear averages were determined by averaging the puretone thresholds for the speech range (500, 1000, and 2000 Hz) in the better ear. Better ear averages are given in decibels according to the ISO standard. For the purposes of tabulations, audiological data reported in the ASA standard were converted to the ISO standard by adding ten decibels to the ASA average. If the standard was not reported but a better ear average could be computed, the results were treated as if reported in ISO standard. The category "Information Not Available" includes those students for whom no audiological information was reported and those for whom better ear averages could not be determined due to the omission of results for one or more of the frequencies used to compute the average.

Better Ear Average	Students in the Achievement Testing Program		All Students in the Annual Survey of Hearing Impaired Children and Youth	
	Number	Percent	Number	Percent
Total Students	16,908	100.0	41,109	100.0
Information Not Available	2,890	17.1	9,055	22.0
Total Known Information	14,018	100.0	32,054	100.0
Under 25 dB	106	.8	1,126	3.5
25 - 39 dB	234	1.7	1,697	5.3
40 - 54 dB	652	4.7	2,388	7.4
55 - 64 dB	969	6.9	2,498	7.5
65 - 74 dB	1,543	11.0	3,541	11.0
75 - 84 dB	2,019	14.4	4,301	13.4
85 dB & Above	8,495	60.6	16,503	51.5

AGE AT ONSET OF HEARING LOSS

This table shows the age of the student when he lost his hearing. The category "Information Not Reported" includes students for whom this information was omitted and those for whom the response of "Unknown" was reported.

Age at Onset of Hearing Loss	Students in the Achievement Testing Program		All Students in the Annual Survey of Hearing Impaired Children & Youth	
	Number	Percent	Number	Percent
Total Students	16,908	100.0	41,109	100.0
Information Not Reported	2,319	13.7	6,891	16.8
Total Known Information	14,589	100.0	34,218	100.0
Onset at Birth	11,269	77.2	26,703	78.8
Under 1 Year	921	6.3	1,968	5.8
1 Year	999	6.8	1,942	5.7
2 Years	621	4.3	1,256	3.7
3 Years	328	2.2	721	2.1
4 - 6 Years	355	2.4	1,084	3.2
7 Years and over	96	0.7	544	1.6

AGE HEARING LOSS DISCOVERED

Presented in this table is the reported age the student's hearing loss was discovered. The "Information Not Reported" category includes the cases where the information was not available or unknown.

Age Hearing Loss Discovered	Students in the Achievement Testing Program		All Students in the Annual Survey of Hearing Impaired Children and Youth	
	Number	Percent	Number	Percent
Total Students	16,908	100.0	41,109	100.0
Information Not Reported	7,793	46.1	16,621	40.4
Total Known Information	9,115	100.0	24,488	100.0
Discovered at Birth	173	1.9	347	1.4
Under 1 Year	1,794	19.7	4,448	18.2
1 Year	2,442	26.8	6,022	24.6
2 Years	1,991	21.8	5,095	20.8
3 Years	1,071	11.7	2,754	11.2
4 - 6 Years	1,322	14.5	4,206	17.2
7 Years and Over	322	3.5	1,616	6.6

PROBABLE CAUSE OF HEARING LOSS

This table presents the probable cause of the student's hearing loss. The causes are shown in regard to occurrence of loss at birth or after birth. The table shows the number of times a particular cause was reported. The category "Information Not Reported" includes those students for whom this information was not reported or cases where there was no known cause of the loss. If two or more causes were attributed to the hearing loss of a child both causes are included. Percent distributions for this table are not shown.

Probable Cause of Hearing Loss	Students in the Achievement Testing Program	All Students in the Annual Survey of Hearing Impaired Children and Youth
Total Students	16,908	41,109
Information Not Reported	8,510	19,916
Causes at Birth		
Maternal Rubella	1,408	6,077
Other Complications of Pregnancy	607	1,518
Trauma at Birth	405	916
Prematurity	944	2,207
Rh Incompatibility	708	1,402
Hereditary	1,626	3,073
Other Causes at Birth	420	844
Causes After Birth		
Meningitis	896	2,017
Mumps	107	351
Measles	491	1,114
Otitis Media	192	927
Trauma	181	420
Fever	258	628
Other Causes After Birth	966	2,000

AGE STARTED EDUCATION PRIOR TO AGE SIX

This table presents data regarding the age a student began his education prior to age six. The category "Some Education, But Age Started Unknown" includes those who had educational training prior to age six, but the actual ages of the children when they started this training are unknown.

Age Started Education Prior to Age Six	Students in the Achievement Testing Program		All Students in the Annual Survey of Hearing Impaired Children and Youth	
	Number	Percent	Number	Percent
Total Students	16,908	100.0	41,109	100.0
Information Not Reported	4,331	25.6	9,049	22.0
Total Known Information	12,577	100.0	32,060	100.0
1 Year	192	1.5	1,122	3.5
2 Years	620	4.9	2,912	9.1
3 Years	2,046	16.3	5,800	18.1
4 Years	2,280	18.1	5,367	16.7
5 Years	2,614	20.8	6,134	19.1
Some Education, but Age Started Unknown	731	5.8	2,185	6.8
No Education Prior to Age Six	4,094	32.6	8,540	26.6

HISTORY OF PARENTAL DEAFNESS BEFORE AGE SIX

Shown here are the number of students whose parents either had normal hearing before age six or suffered a hearing loss prior to this age. The number refers to the number of students and not the number of parents.

History of Parental Deafness Before Age Six	Students in the Achievement Testing Program		All Students in the Annual Survey of Hearing Impaired Children and Youth	
	Number	Percent	Number	Percent
Total Students	16,908	100.0	41,109	100.0
Information Not Reported	4,596	27.2	12,515	30.4
Total Known Information	12,312	100.0	28,594	100.0
Both Parents Normal Hearing	10,909	88.6	25,506	89.2
Both Parents With Loss	612	5.0	1,044	3.7
One Parent With Loss	474	3.8	1,161	4.1
One Parent Normal Hearing, Information for Other Parent Not Reported	317	2.6	883	3.1

ADDITIONAL HANDICAPPING CONDITIONS

Additional handicapping conditions refers to educationally significant handicaps the students had in addition to impaired hearing. The table shows the number of times a particular handicapping condition was reported. The category "Number with No Handicaps" refers to those students for whom it was stated that no additional handicaps were present. The "Information Not Available" group includes those students for whom this information was not reported. The category "Total Number of Conditions" is the summation of all the handicapping conditions reported and not the number of students having these conditions. If a student had two additional handicaps, both handicaps are included. Percent distributions for this variable are not shown.

Additional Handicaps	Students in the Achievement Testing Program	All Students in the Annual Survey of Hearing Impaired Children and Youth
Total Students	16,908	41,109
Number with no Handicaps	10,676	23,874
Information Not Available	2,201	6,255
Total Number of Conditions	4,726	13,662
Brain Damage	63	168
Cerebral Palsy	432	1,123
Cleft Lip or Palate	54	214
Emotional and Behavioral Problems	1,233	3,338
Epilepsy	78	226
Heart Disorders	158	750
Learning Disabilities	459	910
Mental Retardation	782	2,440
Orthopedic Disorders	88	250
Perceptual Motor Disorders	657	1,885
Severe Visual	477	1,699
Other	245	659

APPENDIX IV

SCHOOLS AND CLASSES THAT PARTICIPATED IN THE ACHIEVEMENT TESTING PROGRAM

ALABAMA
- Alabama Institute for the Deaf and Blind
- Blossomwood Elementary School
- Children's Center of Montgomery, Inc.
- Holt Elementary School
- University of Montevallo Speech and Hearing Clinic

ALASKA
- Anchorage Borough School District

ARIZONA
- Arizona State School for the Deaf and Blind
- Phoenix Day School for the Deaf

ARKANSAS
- Jenkins Memorial Children's Center

CALIFORNIA
- Alhambra City School District
- Anaheim Union High School District
- Bellflower Unified School District
- Mary E. Bennett School for the Deaf
- Butte County Schools
- California School for the Deaf, Riverside
- Cedarcreek School for the Deaf
- Centralia School District
- Chula Vista City School District
- Covina Valley Unified School District
- El Centro Elementary School District
- Escondido Union School District
- Garden Grove Unified School District
- Goleta Union Elementary School District
- Kern County Schools
- La Mesa-Spring Valley School District
- Lancaster Elementary School District
- Livermore Valley Joint Unified School District
- Lompoc Unified School District
- Marin County Schools
- Marlton Elementary School
- Monterey County Schools
- Mt. Diablo Unified School District
- Oakland City Unified School District
- Orange Unified School District
- Pasadena City Unified School District
- Placer County Public Schools
- Riverside Unified School District
- San Bernardino County Schools
- San Diego Unified School District
- San Francisco County Schools
- San Jose City Unified School District
- San Juan Unified School District
- Santa Ana Unified School District
- Santa Clara Unified School District
- Santa Rosa City School District
- Simi Valley Unified School District
- Solano County Schools
- Stockton Unified School District
- Sutter County Schools
- Tehama County Public Schools
- Tulare County Schools
- Tulare Union High School District

COLORADO
- Colorado School for the Deaf and Blind
- John Evans School
- Meadow Elementary School

CONNECTICUT
- American School for the Deaf
- Class for Preschool Hearing Impaired Children, Hartford
- East Hartford Public Schools
- Green Acres School
- Hamden-New Haven Cooperative Educational Center
- Magrath School
- Mystic Oral School for the Deaf
- West Haven Department of Special Education

DELAWARE
- Margaret S. Sterck School for Hearing Impaired

DISTRICT OF COLUMBIA
- Capital Region Model Secondary School (MSSD)
- Kendall School for the Deaf
- Speech and Hearing Center-Public Schools of the District of Columbia

FLORIDA
- Brevard County Public Schools
- Florida School for the Deaf and Blind
- Leon County Program for Hearing Impaired Children
- Robert McCord Oral School
- Palm Beach County Schools
- Rock Lake Elementary School

GEORGIA
- Atlanta Public Schools
- Atlanta Speech School, Inc.
- Cobb County Board of Education
- Lawton B. Evans School
- Houston Speech and Hearing School
- Robert Shaw Center

HAWAII
- Central Intermediate School
- Diamond Head School for the Deaf
- McKinley High School

IDAHO
- Idaho School for the Deaf and Blind

ILLINOIS
- Bell Elementary School
- Bi-County Oral Deaf Program
- Black Hawk Hearing Handicapped Program
- Champaign Community Schools
- Chicago Vocational High School
- Decatur Public School District
- Elim Christian School for the Exceptional Child
- Ericson School
- Illinois School for the Deaf
- Jamieson School
- Marquette Elementary School
- Thomas Metcalf School
- Morrill Elementary School
- Northern Suburban Special Education District
- Northwest Suburban Special Education Organization
- Northwestern Illinois Association
- Perry School
- Ray School
- Reinberg School
- Scammon School
- Shields Elementary School
- South Metropolitan Association for Low-Incidence Handicapped
- Special Education District of Lake County
- Springfield Public Schools
- West Suburban Association for the Hearing Handicapped
- James Ward Elementary School

INDIANA
- Glenwood Elementary School
- Hammond Public Schools
- Indiana School for the Deaf
- Marion Community Schools
- Morrison-Mock School
- Fayette County Schools Corporation

IOWA
- Black Hawk-Buchanan County Board of Education
- Cedar Rapids Community Schools
- Hope Haven School
- Iowa School for the Deaf
- Wilson School-Oral Deaf Department

KANSAS
- Kansas School for the Deaf
- Wichita Public Schools

KENTUCKY
- Kentucky School for the Deaf
- Louisville Public Schools

LOUISIANA
- Acadia Parish School Board
- Lafayette Parish School Board
- Louisiana School for the Deaf
- Monroe City Schools
- Sunset Acres School

MAINE
- Governor Baxter State School for the Deaf

MARYLAND
- Baltimore County Department of Special Education
- Maryland School for the Deaf
- Montgomery County Public Schools
- Prince George's County Public Schools

MASSACHUSETTS
- Belmont Public Schools
- Beverly School for the Deaf
- Boston School for the Deaf
- Peter Bulkeley School
- Clarke School for the Deaf
- Lawrence Primary Program for the Deaf
- Leominster Day Classes for the Hearing Impaired
- Horace Mann School for the Deaf
- Mercer School
- Willie Ross School for the Deaf
- Upsala Street School
- Woburn Day Class Program
- Worcester County Hearing and Speech Center

MICHIGAN
- Howard D. Crull Intermediate School (Roosevelt Elementary)
- Detroit Day School for Deaf
- Douglas School
- Durant-Tuuri-Mott School
- Escanaba Area Jr. High School
- Ferndale Public Schools
- Handley School
- Ida Public Schools
- Kalamazoo Public Schools
- Ann J. Kellogg School
- Lakeview Elementary School
- Lakeview Public Schools
- Lindemann Elementary School
- Lutheran School for the Deaf
- Marquette Elementary
- Michigan School for the Deaf
- Oakland Schools
- Public School Program for Deaf and Hard-of-Hearing, Jackson
- Traverse City Public Schools
- Utica Schools

MINNESOTA
- Duluth Public Schools
- Minnesota School for the Deaf
- St. Paul Area Program for Impaired Hearing

MISSISSIPPI
- Mississippi School for the Deaf
- Popp's Ferry Elementary School

MISSOURI
- Central Institute for the Deaf
- Delaware Elementary School
- Litzsinger School
- Missouri School for the Deaf
- St. Louis County Special School District for the Handicapped
- School District of Kansas City

MONTANA
- Montana State School for the Deaf and Blind

NEBRASKA
- Nebraska School for the Deaf
- Omaha Public Schools
- Prescott Acoustically Handicapped Unit

NEVADA
- Ruby S. Thomas Elementary School

NEW HAMPSHIRE
- Crotched Mountain School for the Deaf

NEW JERSEY
- Bruce Street School
- Class for the Hard of Hearing, Kearny
- Cumberland County Public Schools
- Hackensack Program for the Deaf
- Marie H. Katzenbach School for the Deaf
- Millburn Avenue School
- Township Public Schools, Neptune
- Woodbridge Public School System

NEW MEXICO
- New Mexico School for the Deaf

NEW YORK
- Board of Cooperative Educational Services, Nassau
- Board of Cooperative Educational Services of Washington, Warren and Hamilton Counties
- Board of Cooperative Educational Services, Suffolk County II
- Board of Cooperative Educational Services, Suffolk County III
- Catholic Charities Day Classes for Deaf Children
- Mill Neck Manor Lutheran School
- New York School for the Deaf – White Plains
- New York State School for the Deaf – Rome
- Rochester School for the Deaf
- St. Francis De Sales School for the Deaf
- St. Joseph's School for the Deaf
- St. Mary's School for the Deaf
- School for Language and Hearing Impaired Children – Public School 158
- Union-Endicott Central School District

NORTH CAROLINA
- Eastern North Carolina School for the Deaf
- North Carolina School for the Deaf

NORTH DAKOTA
- Longfellow School
- North Dakota School for the Deaf

OHIO
- Alexander Graham Bell School for the Deaf, Cleveland
- Canton Public Schools
- Kennedy School for the Deaf
- Kent Public Schools
- Lakewood Public Schools
- Lorain Board of Education
- Mansfield City Schools
- Ohio School for the Deaf
- Program for Physically Handicapped, Toledo
- Springfield City Schools
- Youngstown Public Schools
- Zanesville Classes for Deaf

OKLAHOMA
- Kerr Junior High School
- Oklahoma City Public Schools
- Oklahoma School for the Deaf
- University of Oklahoma Medical Center

OREGON
- Oregon State School for the Deaf
- Portland Public Schools
- Tucker-Maxon Oral School
- Washington County Intermediate Education District

PENNSYLVANIA
- DePaul Institute
- Ebensburg State School and Hospital
- Erie City School District
- Home of the Merciful Saviour for Crippled Children
- Willis and Elizabeth Martin School
- Pennsylvania School for the Deaf
- Pennsylvania State Oral School for the Deaf
- Programs for Speech and Hearing Handicapped:
  - Centre County Schools
  - Clinton County Schools
  - Fayette County Schools
  - Northampton County Schools
- Western Pennsylvania School for the Deaf

RHODE ISLAND
- Rhode Island School for the Deaf

SOUTH CAROLINA
- Florence County School District #3
- Pate Elementary School
- South Carolina School for the Deaf and Blind

SOUTH DAKOTA
- South Dakota School for the Deaf

TENNESSEE
- Knox County Public Schools
- Memphis Parents' School for Deaf and Aphasic
- Tennessee School for the Deaf

TEXAS
- Abilene Public Schools – Day Class for the Deaf
- Austin Independent School District
- Bexar County School for the Deaf
- P.F. Brown Elementary School
- The Callier Hearing and Speech Center
- Corpus Christi Independent School District
- County-Wide Area Day School, El Paso
- Dallas Independent School District
- Hereford Independent School District
- Houston Independent School District
- Houston School for Deaf Children
- Tarrant County Day School for Deaf
- Texas School for the Deaf
- Wichita Falls Independent School District

UTAH
- Utah Schools for the Deaf and Blind
- Utah State University – Edith Bowen Laboratory School

VERMONT
- Austine School for the Deaf

VIRGINIA
- Arlington County Public Schools
- Charlottesville Public Schools
- Diagnostic, Adjustive and Corrective Center for Learning
- Virginia School for the Deaf and Blind
- Virginia State School for the Deaf at Hampton

WASHINGTON
- Bellevue Public Schools
- Bellingham School District #501
- Edna E. Davis School

Northshore School District #417
Seattle Public Schools
Shoreline School District #412
Washington State School for the Deaf

WEST VIRGINIA
West Virginia School for the Deaf and the Blind

WISCONSIN
City District Public Schools, La Crosse
Day School for the Deaf, Wausau
Lincoln Elementary, Eau Claire
Madison Public Schools
Pleasant Hill School
St. John's School for the Deaf
School for the Deaf, Green Bay
School for the Deaf, Oshkosh
E. H. Wadewitz School
Wisconsin School for the Deaf

WYOMING
Wyoming School for the Deaf

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